T470 User's Manual, Part B … Display Device support … V039 release

Ed Schoell, Dec 16th 2015

This manual covers the display devices supported by the T470.

Devices are covered in alphabetical order of manufacturer, with projectors first, followed by flat panels.

Codes can be entered in a number of ways:

- Via the JED PC application: entering the 4-digit code here will then show an ID message giving a summary of the selection and key variables (e.g. baud rate or volume range). The "Previous" and "Next" buttons can also be used to roll the selection through available codes. (The list rolls over the upper and lower ends of the list);
- Via a T470 keyboard using the key-entry sequence preceded by a PIN number. (Part A of this manual describes this process (in future)); or

Phantom device driver

The T470 device data-base includes four "Phantom" devices for test purposes … they send out descriptive text strings at 9600 baud 8N1 format and are a useful training and familiarisation tool. All channels are allocated with imagined sources and a channel number. Try allocating sources to keys and use the Monitor mode to see the results.

Phantom devices ID are:

Phantom Abs Vol	; Code 0000h	Phantom Inc Vol	; Code 0010h
Phantom Abs Blank Mute	; Code 0020h	Phantom Toggle Blank Mute	; Code 0030h

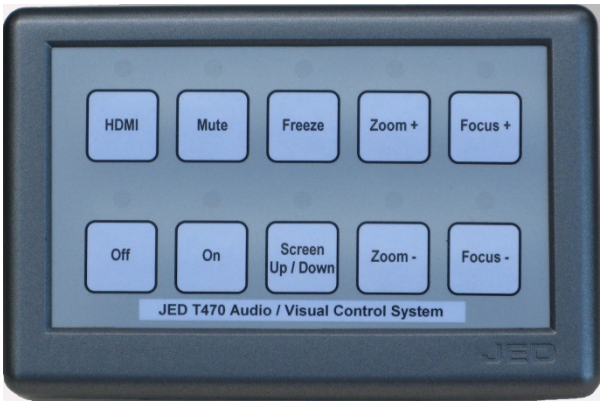
Table of Contents

BenQ: Code 1000h

Recent models only are supported: BenQ have many older models which don't support RS232 comms well.

Source	Label/Connector	Code sent	Comments
0	Computer 1: DSUB RGB	00DH,'*sour=RGB#',00DH	
1	Computer 2: DSUB RGB 2	00DH,'*sour=RGB2#',00DH	Some only
2	USB-A mem.	00DH,'*sour=usbreader#',00DH	Some only
3	USB-B Disp.	00DH,'*sour=usbdisplay#',00DH	Some only
4	Component /1	00DH,'*sour=ypbr#',00DH	
5	Component /2	00DH,'*sour=ypbr2#',00DH	Some only
6	DVI-A	00DH,'*sour=dviA#',00DH	Some only
7	Composite	00DH,'*sour=vid#',00DH	
8	S-Video	00DH,'*sour=svid#',00DH	
9	DVI-D	00DH,'*sour=dvid#',00DH	Some only
A	HDMI 1	00DH,'*sour=hdmi#',00DH	
B	HDMI 2	00DH,'*sour=hdmi2#',00DH	Some only
C	DisplayPort	00DH,'*sour=dp#',00DH	Some only
D	Wireless	00DH,'*sour=wireless#',00DH	Some only
E	Network	00DH,'*sour=net#',00DH	Some only
F	HDBaseT	00DH,'*sour=hdbaset#',00DH	Some only

- **BlankOn/BlankOff, SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;

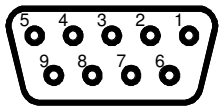


- Special keys labelled: **Zoom +, Zoom-, Focus+ and Focus-** are supported for projectors with RS232 commands for these functions, e.g. the PW9500. These keys auto-repeat. See layouts KB1021A (photo) as an example;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;

- Audio Volume range is limited and incremental. Some BenQ projectors do not have audio out, and audio inputs are often limited;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Comms is assumed at 19200 8N1. The projector may need to be setup to this if it is adjustable;
- "Source scan", or "Quick Auto Search" must be turned off using normal on-screen menu options;
- In "System Setup: Advanced" | Standby Settings | press Enter, then set "Network" to ON to enable RS232 comms; and
- You must turn off "Auto Power Off" and "Direct Power On" in "Config" menu.

RS232 connections to BenQ projectors with D9, female on projector

These all use a D-sub 9-pin connector, female on projector, male on cable. Communications runs at 19200 8N1.

Function/Direction	**T470 serial Connection**	**Projector Connector (Male on cable)**	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

BenQ No CR: Code 1200h

BenQ SH960 (These differ from usual BenQ codes, in that there is no <CR> either side of command string.)

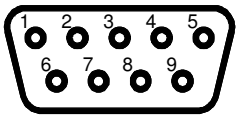
Source	**Label/Connector**	**Code sent**	**Comments**
0	Computer 1: DSUB RGB	'*sour=RGB#'	
1	Computer 2: DSUB RGB 2	'*sour=RGB2#'	
4	Component	'*sour=ypbr#'	
7	Composite	'*sour=vid#'	

A	HDMI	'*sour=hdmi#'	
D	S-Video	'*sour=svid#'	

- **BlankOn/BlankOff, SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Audio Volume range is limited and incremental. Some BenQ projectors do not have audio out, and audio inputs are often limited;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is NOT supported ;
- In System Setup: “Auto Power Off” -> “Disable, “Sleep Time” -> Disable, “Quick Auto Search” -> Off;
- In Advanced Setup: In Lan Control Settings -> Control by RS232;
- In Advanced Setup: In Baud rate -> 19200;
- In Advanced Setup: Direct Power On -> Set OFF, Direct Power Off -> Set OFF

RS232 connections to BenQ projectors with D9, female on cable

Most recent models use a 9-pin-D9 male on the projector, female on cable. Communications is at 19200 baud, 8N1.

Function/Direction	**T470 serial Connection**	**“Serial” Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Canon ASCII: Code 1400h

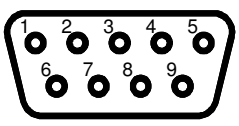
SX6000/WX6000, WUX4000/WUX5000, SX80 MkII / SX800, WUX10 Mk II

Source	Label/Connector	Code sent	Comments
0	A-RGB1	'INPUT=A-RGB1',00DH	Used if 2 RGB analog in (DB15)
1	A-RGB2	'INPUT=A-RGB2',00DH	Used if 2 RGB analog in (DVI-I)
2	A-RGB	'INPUT=A-RGB',00DH	Used if only 1 RGB analog in (DVI-I)
4	Component	'INPUT=COMP',00DH	On DB15 (some only)
7	Video	'INPUT=VIDEO',00DH	
9	D-RGB	'INPUT=D-RGB',00DH	On DVI-I (Some only)
A	HDMI	'INPUT=HDMI',00DH	(Some only)
D	S-Video	'INPUT=S-VIDEO',00DH	(Some only)
F	USB-A	'INPUT=USB',00DH	(Some only)

- **BlankOn/BlankOff,** are all supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- No audio commands are provided;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is NOT supported ;
- There may well be auto-source functions to turn off and standby mode to setup to enable RS232. These are not mentioned in the manual.

RS232 connections to Canon projectors with D9, female on cable

This uses a 9-pin-D9 male on the projector, female on cable. Communications is at 19200 baud, 8N1.

Function/Direction	T470 serial Connection	"Serial" Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Dell: Code 1800h

1209S, 1409X, 1420x 1430x 1510X, 1609WX, 1610HD, 4210X, 4220, 4310WX, 4320, 4610X, 5100, 7700fullHD 7609WU, S300wi, S300W/WI, S320, S320wi, S500w/wi, S520, 2400mp

Manuals are at: **http://www.dell.com/support/home/us/en/19/Products/display_projector/projector**

Source	Label/Connector	Code sent	Comments
0	Computer 1	0BEH,0EFH,010H,005H,000H,0CCH,0FFH,011H,011H,001H,000H,019H	DB-15 1
1	Computer 2	0BEH,0EFH,010H,005H,000H,028H,0FEH,011H,011H,001H,000H,069H	DB-15 2
2	USB-B Disp	0BEH,0EFH,010H,005H,000H,062H,0BEH,011H,011H,001H,000H,08EH	
4	Component	0BEH,0EFH,010H,005H,000H,0DEH,03FH,011H,011H,001H,000H,020H	3 x RCA
7	Video	0BEH,0EFH,010H,005H,000H,0DFH,07FH,011H,011H,001H,000H,023H	RCA
8	S-Video	0BEH,0EFH,010H,005H,000H,01FH,0BEH,011H,011H,001H,000H,022H	DIN 4
A	HDMI 1	0BEH,0EFH,010H,005H,000H,03AH,03EH,011H,011H,001H,000H,050H	
B	HDMI 2	0BEH,0EFH,010H,005H,000H,0E9H,07FH,011H,011H,001H,000H,06BH	
C	DisplayPort	0BEH,0EFH,010H,005H,000H,02BH,03EH,011H,011H,001H,000H,06BH	
D	Wireless	0BEH,0EFH,010H,005H,000H,061H,07EH,011H,011H,001H,000H,08BH	
E	Intel WiDi	0BEH,0EFH,010H,005H,000H,0ACH,03FH,011H,011H,001H,000H,098H	Wireless Display
F	USB-A	0BEH,0EFH,010H,005H,000H,0A2H,07FH,011H,011H,001H,000H,08FH	

- **BlankOn/BlankOff** and **FreezeOn/FreezeOff** are supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- No blink OFF coms status is available;
- Run-time On-state ReplyMode is NOT supported ;
- There may well be auto-source functions to turn off and standby mode to setup to enable RS232. These are not mentioned in the manual.

RS232 connections to DELL projectors.

Communication is at 19200 8N1

To connect the T470 to these projectors use a mini-DIN 6 male on the cable:

Function/Direction	**T470 "projector" Connection**	**Projector Connector 6-pin mini-DIN**	 Mini-DIN 6 solder side
Ground	Ground	Mini-DIN Pins 1, 2	
Data from T470 to projector	Tx	Mini-DIN Pin 3 (RXD)	
Reply data from projector to T470	Rx	Mini-DIN Pin 5 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Eiki/Sanyo: Code 1C00h

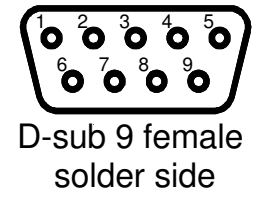
Recent models only are supported. Sanyo was taken over by Panasonic, but there are many still “out there”.

Source	Label/Connector	Code sent	Comments
0	Computer 1 (C50)	'C50',00DH	
1	Computer 2 (C06)	'C06',00DH	
3	Computer 2 (C25)	'C25',00DH	
4	Component 1 (C54)	'C54',00DH	
5	Component 2 (C24)	'C24',00DH	
6	DVI AV HDCP (C53)	'C53',00DH	Some only
7	Video (C07)	'C07',00DH	
8	Video (C33)	'C33',00DH	
9	DVI PC Digital (C52)	'C52',00DH	Some only
A	HDMI 1 (C04)	'C04',00DH	Some only
B	HDMI 2 (C4F)	'C4F',00DH	Some only
E	Network (C08)	'C08',00DH	
F	S-Video (C34)	'C34',00DH	Some only

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Audio Volume range is 0-21 absolute using the extended command CF VOLUME;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Comms is assumed at 19200 8N1. The projector may need to be setup to this if it is adjustable;
- You must turn “Standby Mode” to “Normal” and “On Start” to “Off” in the “Setting” menu.

RS232 connections to Sanyo/ Eiki projectors

Most recent use a 9-pin-D9 male on the projector, female on cable. Communications is at 19200 baud, 8N1.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Epson VP21 Two VGA Net53: Code 2000h,
Epson VP21 Two VGA Net50: Code 2010h,
Epson VP21 VGA/BNC Net53, G/Z series. : Code 2020h,
Epson VP21 VGA/BNC Net50: Code 2030h
Epson VP21 Two VGA, Mirror, Net53: Code 2040h

Most Epson projectors use **SOURCE 53** for Network , and need **Code 2000h.** (Use this if no network.) Some are : EB-84, EB-85, EB-824, EB-825, EB-826W, EB-95, EB-96W, EB900, EB-905, EB-910W, EB-915W, EB-925, EB-420, EB-425W, EB-430, EB-435W, EB-440W, EB-450W, EB-450Wi, EB460, EB460i, EB-470, EB-475W, EW475Wi, EB-480, EB-480i, EB-485W, EB-485Wi, EB-1400Wi, EB-1410Wi, EB-1750, EB-1751, EB-1760W, EB-1761W, EB-1770W, EB-1771W, EB-1775W, EB-1776W, EB-1830, EB-1840W, EB-1850W, EB-1860, EB-1870, EB-1880, EB-1900, EB-1910, EB-1915, EB-1920W, EB-1925W, EB-1970W, EB-1975W, EB-1980WU, EB-1985WU, EB-G5500, EB-G5600, EB-G5650W, EB-G5800, EB-G5900, EB-G5950, EB-S18, EB-W18, EB-X18, EB-X24.

Some projectors have both two DB15 ports and a 5-BNC port so support both the "SOURCE21/24" AND SOURCEB1/B4. Depending on the installation's use of the second DB15 or BNC, either Code 2000h OR Code 2020h can be used if Network is "Source 53", or either Code 2010h and Code 2030h can be used if Network is "aSource 50" Some are: EB-G5100, EB-G5150, EB-G5200W, EB-G5300, EB-G5350

Code 2010h: (2 x VGA) Some Epson projectors use **SOURCE 50** for network. (Also called EasyMP.)
Some are: EMP-1800, EMP-1815, EB-G5100, EB-G5150, EB-G5200W, EB-G5300, EB-G5350.

Code 2020h: This group replaces the second DB15 connector with **5 BNC connectors**, used for RGB and Component. (Uses **SOURCE 53** for Network.) Also has **HDBaseT** as source 15 for G and Z series which use this in place of USB-A.
Some are: EB-4550, EB-4650, EB-4750W, EB-4850WU, EB-4855WU, EB4950WU, EB-4955WU, EB-G5450WU, EB-G5750WU, EB-G6050, EB-G6150, EB-G5250W, EB-G6350, EB-G6450WU, EB-G6550WU, EB-G6650WU, EB-G6750WU.
EB-Z8000WU/WUNL, EB-Z8050W EB-Z8150, EB-Z8250NL, EB-Z8255NL, EB-Z8350WNL, EB-Z8355W/NL, EB-Z8450WU/NL, EB-Z8455WU/NL, EB-Z9750U, EB-Z9800W, EB-Z9870, EB-Z9875U, EB-Z9900W, EB-Z10000, EB-Z10000U, EB-Z10005, EB-Z10005U, EB-Z11000, EB-Z11000W, EB-Z11005.

Code 2030h: This group replaces the second DB15 connector with 5 BNC connectors, used for RGB and Component. (Uses **SOURCE 50** for Network.) Some are: EB-G5100, EB-G5150, EB-G5200W, EB-G5300, EB-G5350

Code 2040h: (2 x VGA), **SOURCE 53** for Network. This replaces Source 9 with "Source 56" for Screen Mirror for communications from tablets and phone devices with Intel "WiDi" communications to place source image onto projected image.

Consult the Source codes in the user manual to see what Source commands to allocate to keys. User's manuals are at: http://tech.epson.com.au/downloads/index.asp?select=7&sCategory=

Source	Label/Connector	Code sent 2000h, 2010h	Code sent 2020h, 2030h	Comments
0	Computer 1	'SOURCE 11',00DH	'SOURCE 11',00DH	DSUB1
1	Computer 2	'SOURCE 21',00DH	'SOURCE 21',00DH	DSUB2 (some only)
2	BNC RGB	'SOURCE B1',00DH	'SOURCE B1',00DH	BNC RGB

3	USB-B Display	'SOURCE 51',00DH	'SOURCE 51',00DH	USB-B computer input
4	Component 1	'SOURCE 14',00DH	'SOURCE 14',00DH	DSUB1
5	Component 2/**BNC**	'SOURCE 24',00DH	**'SOURCE B4',00DH**	DSUB2 **/ BNC**
6	Component 3	'SOURCE C5',00DH	'SOURCE C5',00DH	RCA COMPONENT /YPbPr
7	Video RCA	'SOURCE 41',00DH	'SOURCE 41',00DH	RCA Some only
8	Video BNC	'SOURCE 45',00DH	'SOURCE 45',00DH	BNC Some only
9	Whiteboard	'SOURCE 55',00DH	'SOURCE 55',00DH	Whiteboard, some only
9	Screen Mirror	'SOURCE 56',00DH (Code 2040)		Screen Mirror via WiDi, some only
A	HDMI1/DVI-D	'SOURCE 30',00DH	'SOURCE 30',00DH	Some only
B	HDMI2/DVI-D	'SOURCE A0',00DH	'SOURCE A0',00DH	Some only
C	DisplayPort	'SOURCE 70',00DH	'SOURCE 70',00DH	Some only
D	SDI	'SOURCE 60',00DH	'SOURCE 60',00DH	BNC, Some only
E	Network 53	'SOURCE 53',00DH	'SOURCE 53',00DH	Chosen by code 2000 / 2020
E	Network 50	'SOURCE 50',00DH	'SOURCE 50',00DH	Chosen by code 2010 / 2030
F	USB-A	'SOURCE 52',00DH	'SOURCE 52',00DH	USB-A socket (memory stick / camera / wireless LAN)

- Combined **Blank/SoundMute** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3, AspectRatio16:9 and Zoom are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Audio Volume range is 0-20 absolute;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

Microphone volume control has been provided for projectors which have a microphone input socket (usually a 3.5mm connector). To use this facility, a keyboard needs to be selected which supports Microphone Volume Up/Down keys, e.g. layout KB1024:

```
Source 1  |  Source 2  |  Source 3  |  Mic Vol Up     |  Vol Up
-------------------------------------------------------------------------------
  Off     | Blnk/Mute |    Freeze   |  Mic Vol Down |  Vol Down
```

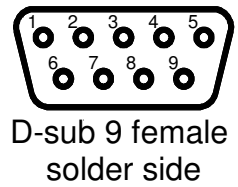
The far right “Vol up” and “Vol Down” keys control all audio levels, program AND microphone. The “Mic Vol Up” and “Mic Vol Down” keys control the **ratio** of microphone to program audio sent to the speakers or audio output connector At the default of “0”, there is no microphone audio sent, and only Program audio is sent at the level controlled by the main Volume keys. If the “Mic Vol Up” key is pressed 10 times (half way up) the audio mix is even Microphone and Program. After 20 presses, the only audio is the Microphone input, with NO Program audio. The actual level is again controlled by the main volume keys.

However, if you set Standby Mode to Communication On (in ECO-Standby Mode menu) and the A/V Output is set to Always On (in Extended – A/V Settings menu) audio output to the internal speakers and the audio output connector is available in “Standby” mode. The main “Volume Up” and “Volume Down” keys become operational and allow either Program audio, a mix, or only Microphone audio to be output, and the level controlled. Audio is NOT available during projector warm-up or cool-down. The Volume Up key must be pressed to turn Standby Audio on, and then the level can be adjusted.

Note: The ratio of program to Microphone audio must be pre-set with the projector On, as the Mic Volume Up and Mic Volume Down keys and are only operational when the projector is running in display mode. They are not operational in Standby. This is a projector limitation, not a JED controller limitation. The Program audio used is the last display channel selected, and likewise, cannot be changed in Standby.

RS232 connections to Epson ESC-VP21 projectors

These use a 9-pin-D9 male on the projector, female on cable. Communications is at 9600 baud 8N1.

Function/Direction	**T470 serial Connection**	**Epson ESC-VP21 “Control” Port**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Epson IR 1, Common Power On/Off: Code 2080h, (EB-S03, W15,17,18,24)
Epson IR 2, Sep. Power On/Off: Code 2090h (most TW, etc)

These panels are controlled either via an IR transmitter "bug" or LED IR transmitter.

Use 2080h for projectors with a single On/Off button/IR code (90h/90h).
Use 2090h for projectors with separate On/Off codes (90h/91h). Note W15/17/18/24 also respond to 91h off.

IR codes are provided for both "Absolute" source selection and for "Rolling" source selection using the "Search" option which is only available for some projectors. A good guide when setting up a keyboard layout to use these drivers is to look at the IR remote supplied with the projector (illustrated in the user manual) and choose source number entries from the table below corresponding to the ones on the IR remote.

There is a tendency to combine sources onto one button to simplify the remote control, so, for instance the "Video" button toggles between Composite Video, S-Video and HDMI (and the "HDMI 1" code below is NOT used). In a similar way, the "USB" button toggles between "USB-A" (e.g. a memory stick) and "USB-B" (USB-Display).

If no absolute source buttons are allocated, use the rolling "Source" button * alone, and don't allocate any absolute key codes. Keep pressing this key until the desired source is reached. (It will only stop on active channels.)

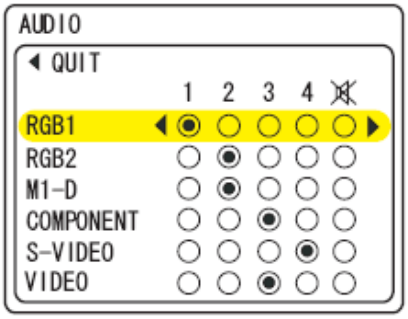
Source	Label/Connector	IR Command Code sent	Comments
0	Computer	94H	DB15
1	Input B	9DH	DB15-B (some only)
3	USBA/B	76H	USB-A (e.g. memory stick) / USB-B (USB-Display)
4	Component	71H	3 x RCA (some only)
7	Vid/HDMI	70H	RCA Composite Video / HDMI
8	S-Video	9CH	S-Video (some only)
A	HDMI 1	73H	HDMI 1 (some only)
B	HDMI 2	77H	HDMI 2 (some only)
E	LAN	74H	LAN (some only)
F	Src-Search	8CH	Source search

- **Mute** / **Blank** and **Freeze** functions are supported;
- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports;
- **This driver MUST use T470 keyboards defined with separate OFF and ON keys**. For projectors with no absolute On and Off IR commands, the general "Power" command is sent **once** when the T470 "On" button is pressed, and the signal is sent **twice** 1.2 seconds apart when the "Off" button is pressed ONCE, simulating the requirement to press the IR-remote's "power" twice, as prompted on the screen. If separate IR codes are available, the appropriate ones are sent.

Hitachi single audio: Code 2400h, **Hitachi Individual Audio:** Code 2410h

Code 2400 projectors have a single Increment and Decrement command for all channels. The level of all channels is controlled by this one pair of commands. So if a level has been dropped for a RGB channel, the audio level is down for the Video input and needs to be manually adjusted up.

Code 2410 has separate Increment and Decrement commands for each source channel. **All recent units are 2410 group.**



It is used when there are a number of audio inputs (2, 3 or 4) but these are unallocated to a video channel. **These must be manually allocated using the projector menu system to suit the audio sources, cables and connectors on site, but any audio input can typically be allocated to any video/RGB input.** Audio channels can be shared or a channel set to have no audio. A typical menu sequence is to go to: Menu -> Advanced menu -> Audio -> Audio, which gives a table of (a variable number of) channel names down the left column, audio inputs by number across the top, and a matrix of buttons which allows one allocation button or an OFF button to be selected per channel. Use the "down" button to select a channel, and the "left" or "right" buttons to move the "dot" to select that channel's audio. Move to the "quit" position to save and use the "left" to exit the menu.

In the back of each user's and/or tech manual is a list of typical channel selection messages, and manuals of most Hitachi projectors are available at: http://www.projectorcentral.com/Hitachi.htm or http://www.hitachi.com/products/personal/av.html

Source	Label/Connector	Code sent in byte 11 of a 12-byte hex message	Comments
0	Computer 1	000h	DSUB1
1	Computer 2	004h	DSUB2
3	BNC x 5	007h	BNC x 5
4	Component (RCA)	005h	RCA
5	Component (BNC)	006h	BNC
7	Video 1 (RCA)	001h	RCA
8	Video 2 (BNC)	00Ah	BNC
9	DVI-D	009h	
A	HDMI (1)	003h	HDMI(1)/Digital/M1D/DVI
B	HDMI (2)	00Dh	
D	S-Video	002h	
F	LAN	00Bh	

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 (small), AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Audio Volume range is incremental, of variable range;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Comms is assumed at 19200 8N1;

RS232 connections to Hitachi

These use either a D-sub 15 shrink jack pin connector, female on cable, or a DB9, female on cable.

Coms at 19200 8N1 (Note: this may have to manually set up in the projector):

Function/ Direction	**T470 serial Connection**	**Hitachi "Control" Port Connector 15-pin shrink**	**Hitachi "Control" Port Connector, DB9**
Ground	Ground	Pin 6, 7 and 10. Use all	Pin 5
Data from T470 to projector	Tx	Pin 13	Pin 2
Reply data from projector to T470	Rx	Pin 14	Pin 3

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Hitachi CP-DH300: Code 2450h

This projector from Hitachi uses BenQ-like codes (but using "(" and ")" instead of "*" in the messages.)

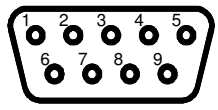
Channel codes are:

Source	Label/Connector	Message	Comments
0	Computer 1	0Dh,'(sour=RGB)',0Dh	DSUB1
1	Computer 2	0Dh,'(sour=RGB2)',0Dh	DSUB2
7	Video RCA	0Dh,'(sour=vid)',0Dh	RCA
8	S-Video	0Dh,'(sour=svid)',0Dh	
A	HDMI	0Dh,'(sour=hdmi)',0Dh	

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Audio Volume range is incremental;
- Off led blink and reply mode are both supported.

RS232 connections to Hitachi

These use a 9-pin-D9 male on the proj, female on cable. **Coms at 115200 8N1.**

Function/Direction	T470 serial Connection	"Serial" Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

InFocus Base 9600: Code 2600h

IN11x, IN12x, IN12xST, IN212x (e.g. IN126)

(Other families at different baud rates to be added as needed.)

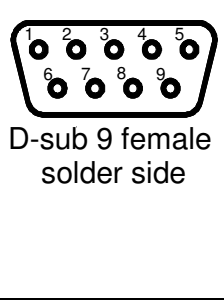
Control codes are at:
http://www.infocus.com/sites/default/files/SupportDocs/InFocus_IN120_Projector_Series/InFocus_IN126_Projector/IN12x_RS232_Commands.pdf

Source	Label/Connector	Code sent	Comments
0	VGA 1	(SRC0)	DSUB1
1	VGA 2	(SRC1)	DSUB2
7	Video 1	(SRC2)	RCA Composite Video
A	HDMI (1)	(SRC4)	HDMI
D	S-Video	(SRC3)	

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- Freeze command is NOT available;
- AspectRatioNative, AspectRatio4:3, AspectRatio16:9, Letterbox and AspectRatio16:10 (on some) are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- There is about a 10 second delay after pressing OFF before the lamp goes out and “Cooldown” starts.
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Comms is assumed at 9600 8N1;

RS232 connections to InFocus with D9

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 9600 baud (not adjustable), 8 bits, no parity, 1 stop.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Mimio Projector: Code 2A00h

Control codes are at: http://www.mimio.com/en-AP/Support/Mimio-Product-Documentation.aspx

Source	Label/Connector	Code sent	Comments
0	Computer 1	'~vgaa'	DSUB1
1	Computer 2	'~vgab'	DSUB2
7	Video	'~composite'	RCA Composite Video
A	HDMI	'~hdmi'	HDMI
D	S-Video	'~svideo'	Din-4

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported at this stage;
- Comms is assumed at 19200 8N1;

RS232 connections to Mimio: It uses a DB9 connector, but we have been unable to determine polarity or connections.

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Mitsubishi Proj (Vol 21): Code 2B00h**,**
Mitsubishi Proj (Vol 21) Slow: Code 2B01h

EX10U, ES-EX100U, FD630U/G HC100, SD220U, S/XD221, S/XD420U, S/XD430U, HC900/E, WD380U-EST, WD385U-EST, WD500U-ST, WD510U, WD510U-G, WD570U, WD2000, WL639U, XD250U, XD250XD, XD280U, XD360U-EST, XD365U-EST, XD435U, XD400U, XD450U, XD460U, XD470U, XD480U, XD490U, XD500, XD510U, XD520U, XD560U, XD2000U, XL6U.

Mitsubishi Proj (Vol 21) LED: Code 2B02h

NW30U, NW31U/EST, NF32U**:** short warmup-closedown, fast channel change, 0->21 volume.

Mitsubishi Proj (Vol 31): Code 2B10h,
Mitsubishi Proj (Vol 31) Slow: Code 2B11h

FL6900, FL7000U, HD8000, MH2850U, UL7400, WL2560U, WL7050U, WL7200U, WL6700U/LU, S/XL4U, XL5U, SL6U, XL8U, XL9U, S/XL25U, XL30U, X200E, S/XD200U, XD300U, XD350U, X390U, X400U, SX490U, X500U, XL550U, XD550U, XD650U, XL650U, XL1550U, XL2550U, XL5900U, XL5950U, XL5980U/LU, XL6500U/LU, XL6600U/LU, XL7100 **InFocus** LP1200

Mitsubishi Proj (Vol 32): Code 2B20h,
Mitsubishi Proj (Vol 32) Slow: Code 2B21h

Mitsubishi Proj (Vol 60): Code 2B30h,
Mitsubishi Proj (Vol 60) Slow: Code 2B31h

S/XL1U, S/XL2U, S/X50U, SA51U, X70/U, X80U

Mitsubishi Proj (Vol 100): Code 2B40h,
Mitsubishi Proj (Vol 100) Slow: Code 2B41h

SD105U, S/XD206U

Mitsubishi Proj (Vol 10): Code 2B50h,
Mitsubishi Proj (Vol 10) Slow: Code 2B51h

Mitsubishi Proj IncDec: Code 2B60h

EX320U, EW330U (projector audio range is 0->10, but there are no absolute volume commands.)

Mitsubishi Proj IncDec by 3s: Code 2B61h

If there is no “Volume commands” paragraph (or no audio in the projector), use the incremental control driver .

No audio: HC1100, HC1500, HC1600, HC3000, HC3100, HC3800, HC4900, HC5000, HC5500, HC6000, HC6500, HC6800, HC7000, HD1000, HD4000, UD8400U, WD8200U/LU

Inc/dec audio: X100E, S/X120E, S/X250U, S290U, X300U

Note: We found some Mitsubishi Projectors have different audio control ranges than the Mit. manual states. If you cannot get the full volume range, try a different code or use the Max Volume setting on the setup screen.

Some Mit. Projectors have a problem with sending the volume setting too soon after sending a source command. The symptom of this is no audio after a source change until a Volume Inc/Dec is sent. If this is the case, select the "slow" codes above.

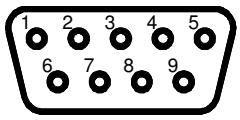
In the back of some user manuals is a list of RS232 control messages.
Also, see master RS232 code list at: (See also "Deleted" tab codes on link on this page.)
http://www.mitsubishi-presentations.com/product-support/downloads/controlcodes/

Source	Label/Connector	Code sent	Comments
0	Computer 1	'00_r1',00DH	DSUB1 Computer1/Component1
1	Computer 2	'00_r2',00DH	DSUB2 Computer2/Component2
3	USB-B Display	'00_s2',00DH	Display from PC
4	Component 1	'00_c1',00DH	3 x RCA Component input or Card 1 input
7	Video 1	'00_v1',00DH	RCA Composite Video
8	Video 2	'00_v2',00DH	RCA Composite Video or S-Video
A	HDMI1	'00_d1',00DH	HDMI 1
B	HDMI2/DVI-D	'00_d2',00DH	DVI/D or HDMI 2
C	HDMI3/SDI	'00_d3',00DH	SDI BNC or HDMI 3
E	Net	'00_n1',00DH	Network
F	USB-A	'00_s1',00DH	USB-A socket (memory stick etc)

- Combined **Blank/SoundMute** is supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- **Freeze** command is available as a toggle function if an appropriate button is allocated;
- Roll **AspectRatio** is supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to Mitsubishi projectors, D9

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 9600 baud, 8 bits, no parity, and 1 stop.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

NEC 38400, Vol 63: Code 2C00h

Some: HT1000, HT1100 (fixed 38400), LT25/LT30/LT35, NP40/NP50/NP60, NP41/NP51/NP61/NP62, NP43/NP54/NP63/NP64, NP110/NP115/NP210/NP215. HT410/HT510, LT180, LT75Z, PA500U, PA500X, PA550W, PA600X, PH1000U, , V230, V230X, V260, VT37, VT46/VT460/VT465/VT560/VT660, VT47/VT470/VT570/VT575/VT670/VT676, VT48/VT57/VT58. With no audio: PX700W, PX750U, PX800X

NEC 38400, Vol 31: Code 2C01h

(It is difficult to determine whether the maximum audio level of a particular projector is 31 or 32 from the NEC data ... if one in this group actually is 32 max, please let JED know, and use the next code. Test using the IR remote.)

LT220/LT240/LT260, LT245/LT265, M230X/M260W/M260X/M300W, M271W/X, M311W/X, M361X, M300W, M300X, M350X, MW420X, MW420XV, NP216, P350W/X, P401W, P451W/X, P501X, P420, PA500U/X, PA550W, PA600X, PE401H, PE501X, U250X, U260W, U300X, U310W, UM280/330X UM280W/X, UM330W/X, UM301W/X, UM351W, UM361X, V281, V311W/X, VE280/X, VE281/X, VE282/X, WT600, WT610/WT615

NEC 38400, Vol 32: Code 2C02h

S/XL1U

NEC 38400, New HDMI 1&2, Vol 32: Code 2C03h

This group supports a newer series of NEC projectors with different HDMI 1 and 2 commands. It also adds a “Slot” device replacing a second Component source command.

Command for HDMI 1 is: 02H,03H,00H,00H,02H,01H,0A1H,0A9H
Command for HDMI 2 is: 02H,03H,00H,00H,02H,01H,0A2H,0AAH
Command for Slot is: 02H,03H,00H,00H,02H,01H,0ABH,0B3H

Devices that should use this code are: PA521U, PA522U, PA571W, PA572W, PA621U, PA621X, PA622U, PA622X, PA671W, PA672W, PA721X, PA722X, and the group: PX602UL-WH, PX602UP-BK, PX602WL-WH, PX602WL-BK.

NEC 19200, Vol 63: Code 2C10h

NP300/NP305/NP310/NP405/NP410/W/NP510/W/WS/NP610/S, NP400/NP500/W/NP600, NP1200, NP2200, NP3200, VT45, VT49/VT59/VT490/VT590, VT480/VT580, VT595/VT695/VT700, VT650,

Canon 19200 baud, (audio status unknown)
LV-7240/LV-7245/LV-X5, LV-7250/LV-X6, LV-7255, LV-7260/LV-7265/LV-X7

NEC 9600, Vol 63: Code 2C20h

LT84/LT140

NEC 4800, Vol 63: Code 2C30h

This is useful for long-line communications to above projectors with alterable baud rates.

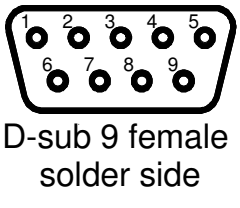
In the back of each “Installation Guide” is a list of typical channel selection messages. **This also shows baud rate**. Also, see master NEC code list at http://www.nec-display-solutions.com/p/uk/en/products/choice.xhtml?cat=Beamer
http://necvisualsystems.com/cms/documents/UserManuals/RS232_PJ_ControlCommands.pdf

Source	Label/Connector	Code sent	Comments
0	Computer 1 In	02H,03H,00H,00H,02H,01H,01H,09H	DSUB1 Computer1/Component1
1	Computer 2 In	02H,03H,00H,00H,02H,01H,02H,0AH	DSUB2 Computer2/Component2
2	Computer 3 In	02H,03H,00H,00H,02H,01H,03H,0BH	5 x BNC Computer3/Component3
3	USB-B Disp	02H,03H,00H,00H,02H,01H,22H,2AH	Display from PC
4	Component (1)	02H,03H,00H,00H,02H,01H,10H,18H	3 x RCA Component input
5	Component (2)	02H,03H,00H,00H,02H,01H,11H,19H	3 x RCA Component input
5	Slot	02H,03H,00H,00H,02H,01H,0ABH,0B3H	Slot (Code 2C03h)
6	DVI Analog	02H,03H,00H,00H,02H,01H,03H,0BH	
7	Video	02H,03H,00H,00H,02H,01H,06H,0EH	RCA Composite Video
8	HDBaseT	02H,03H,00H,00H,02H,01H,20H,28H	RJ45 (same code as Network)
9	DVI	02H,03H,00H,00H,02H,01H,1AH,22H	
A	HDMI1	02H,03H,00H,00H,02H,01H,1AH,22H	HDMI 1
A	HDMI 1 new	02H,03H,00H,00H,02H,01H,0A1H,0A9H	HDMI 1 (Code 2C03h)
B	HDMI 2	02H,03H,00H,00H,02H,01H,1BH,23H	DVI/D or HDMI 2
B	HDMI 2 new	02H,03H,00H,00H,02H,01H,0A2H,0AAH	HDMI 2 (Code 2C03h)
C	DisplayPort	02H,03H,00H,00H,02H,01H,0A6H,0AEH	DisplayPort
D	S-Video	02H,03H,00H,00H,02H,01H,0BH,13H	
E	Network	02H,03H,00H,00H,02H,01H,20H,28H	Network (same code as HDBaseT)
F	USB-A View	02H,03H,00H,00H,02H,01H,1FH,27H	USB-A socket (memory stick etc)

- **BlankOn/BlankOff, SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- Roll **AspectRatio** is supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to NEC projectors, D9

These use a 9-pin-D9 male on the proj, female on cable. Comms is at 9600 baud, 8 bits, no parity, and 1 stop.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Optoma 1/2, Vol 0->10: Code 2C80h (Basic Optoma driver).

Optoma 1/0, Vol 0->10: Code 2C81h

Optoma have most units using codes PowerUp: '~0000 1', 00DH and PowerDown: '~0000 2', 00DH.

An alternate group needs codes of PowerUp: '~0000 1', 00DH and PowerDown: '~0000 0', 00DH.

Some deliberately support BOTH “1 / 2” and “1 / 0” controls: Use Code 2C80h for these.

Optoma 1/2, Vol 0->15: Code 2C82h

Optoma 1/0, Vol 0->15: Code 2C83h

Optoma 1/2, Vol 0->20: Code 2C84h

Optoma 1/0, Vol 0->20: Code 2C85h

In the back of each “User’s Manual” is a list RS232 codes. The command strings can normally be found by doing a search for the string ‘9600’ (the baud rate across all units).

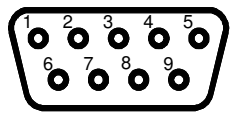
Source	Label/Connector	Code sent	Comments
0	VGA 1	'~0012 5',00DH	DSUB1
1	VGA 2	'~0012 6',00DH	DSUB2 Some only
2	RGB BNC	'~0012 4',00DH	RGB BNC
3	USB-B Disp	'~0012 19',00DH	USB Display
4	Component 1	'~0012 8',00DH	VGA 1 Component Y, Pb/Cb, Pr/Cr
5	Component 2	'~0012 13',00DH	VGA 2 Component Y, Pb/Cb, Pr/Cr ** also USB Display on EX565/665/675/685/695
6	Comp.t RCA	'~0012 14',00DH	RCA COMPONENT /YPbPr
7	Video RCA	'~0012 10',00DH	RCA
8	DVI-I	'~0012 3',00DH	DVI-I
9	DVI-D	'~0012 2',00DH	DVI-D
A	HDMI 1	'~0012 1',00DH	HDMI 1
B	HDMI 2	'~0012 15',00DH	HDMI 2
C	HDMI 3	'~0012 16',00DH	HDMI 3
D	Disp.Port	'~0012 20',00DH	DisplayPort

E	Network	'~0012 18',00DH	LAN
F	USB-A	'~0012 17',00DH	USB-A socket (memory stick

- Combined **Blank/SoundMute** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3, AspectRatio16:9 and AspectRatio16:10 (WXGA units only) are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Audio Volume range is normally 0-> 10 but a few are 0->15 or 0->20 absolute. There latter are supported with their own codes (see above);
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Comms is 9600 8N1;

RS232 connections to Optoma projectors

These use a 9-pin-D9 male on the projector, female on cable. Communications is at 9600 baud 8N1.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Panasonic projectors OSH:0/1: Code 3000h.

(This group does not use addressed commands)

(Panasonic use several different ways to control the Blank (Shutter) function. See the code spec sheets to see how a particular projector runs this function.) e.g. PT-VW530, PT-VW535N,PT-VX60, PT-VX600, PT-VX605N, PT-VZ570, PT-VZ575

This group uses OSH1/OSH0 for Blank (Shutter) On and Off respectively.

Panasonic projectors OSH/HD1: Code 3010h

This group uses OSH to turn blank (Shutter) On and a dummy channel change “02H,'IIS:HD1',03H” when blanked to turn it off. (The channel does NOT actually change, just generates an error code and un-blanks.)

Panasonic projectors OSH/OSH: Code 3020h

This uses “02H,'OSH',03H” to toggle Blank (Shutter) On and Off.

In the back of each “User Guide” is a list of typical channel selection messages
https://eww.pavc.panasonic.co.jp/projector/extranet/main/sitemap/index.html

Source	Label/Connector	Code sent	Comments
0	Computer 1	02H,'IIS:RG1',03H	DSUB1
1	Computer 2	02H,'IIS:RG2',03H	DSUB2
2	Computer 3	02H,'IIS:RG3',03H	DSUB3
4	Component YUV	02H,'IIS:YUV',03H	RCA
5	Component 1	02H,'IIS:CP1',03H	BNC
6	Component 2	02H,'IIS:CP2',03H	RCA
7	Video	02H,'IIS:VID',03H	RCA
8	Aux	02H,'IIS:AUX',03H	
9	DVI	02H,'IIS:DVI',03H	DVI
A	HDMI 1	02H,'IIS:HD1',03H	HDMI
B	HDMI 2	02H,'IIS:HD2',03H	HDMI
C	HDMI 3	02H,'IIS:HD3',03H	HDMI
D	HDMI old	02H,'IIS:HDM',03H	HDMI
E	Network	02H,'IIS:NWP',03H	
F	S-Video	02H,'IIS:SVD',03H	

Panasonic projectors Addressed mode (OSH:0/1): Code 3100h.

This uses “02H,'ADZZ;OSH:1',03H” to Blank (Shutter) On and “02H,'ADZZ;OSH:0',03H” Off.

Panasonic projectors Adr(OSH/HD1): Code 3110h

This group uses “02H,'ADZZ;OSH',03H” to turn blank (Shutter) On and a dummy channel change “02H,'IIS:ADZZ;HD1',03H” when blanked to turn it off. (The channel does NOT actually change, just generates an error code and un-blanks.)

Panasonic projectors Adr (OSH/OSH): Code 3120h

This uses “02H,'ADZZ;OSH',03H” to toggle Blank (Shutter) On and Off.

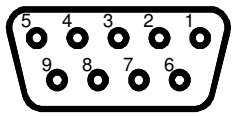
Source	Label/Connector	Code sent	Comments
0	Computer 1	02H,'ADZZ;IIS:RG1',03H	DSUB1
1	Computer 2	02H,'ADZZ;IIS:RG2',03H	DSUB2
2	Computer (PC1)	02H,'ADZZ;IIS:PC1',03H	PC1
3	Computer (PC2)	02H,'ADZZ;IIS:PC2',03H	PC2
4	Component YUV	02H,'ADZZ;IIS:YUV',03H	
5	Component 1	02H,'ADZZ;IIS:CP1',03H	
6	Component 2	02H,'ADZZ;IIS:CP2',03H	
7	Video	02H,'ADZZ;IIS:VID',03H	RCA
8	DigitalLink 1	02H,'ADZZ;IIS:DL1',03H	Shielded CAT5e solid
9	DVI-I	02H,'ADZZ;IIS:DVI',03H	DVI
A	HDMI 1	02H,'ADZZ;IIS:HD1',03H	HDMI
B	HDMI 2	02H,'ADZZ;IIS:HD2',03H	HDMI
C	SD1	02H,'ADZZ;IIS:SD1',03H	BNC
D	SD2	02H,'ADZZ;IIS:SD2',03H	BNC
E	Network	02H,'ADZZ;IIS:NWP',03H	
F	SDI	02H,'ADZZ;IIS:SDI',03H	BNC

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state. The “Toggle” code entry above (Code:3020h) uses a toggle mode for the LED, and it does NOT indicate current state for this entry.

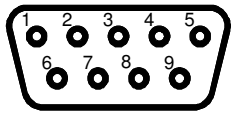
- An **AlignPixels (AutoSetup)** function is available if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Make sure to turn off "Auto input search" if your projector includes this;
- **Make sure to set the baud rate to 9600** and no parity if an adjustment menu is provided. Select "AMX D. D." mode if only 19200 mode is shown … this will set 9600 baud.

RS232 connections to Panasonic projectors: Three systems in use:

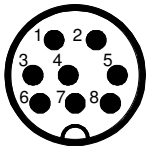
D-SUB 9 Female on projector, male on cable. Comms at 9600 8N1

Function/Direction	T470 serial Connection	Panasonic Serial Port Connector	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 2 (TXD)	

D-SUB 9 Male on projector, female on cable. Comms at 9600 8N1

Function/Direction	T470 serial Connection	Panasonic Serial Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

Mini-DIN-8 socket on projector. Comms at 9600 8N1

Function/Direction	T470 serial Connection	Panasonic Serial Port Connector	 Mini-DIN 8 solder side
Ground	Ground	mini-DIN 8 pin 4	
Data from T470 to projector	Tx	mini-DIN 8 pin 3 (RXD)	
Reply data from projector to T470	Rx	mini-DIN 8 pin 5 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Sharp projectors: Code 3C00h.

Sharp do not appear to be still manufacturing projectors, but many are still in use.

Source	Label/Connector	Code sent	Comments
0	Computer 1	'IRGB 1',00DH	DSUB1
1	Computer 2	'IRGB 2',00DH	DSUB2, BNC, DVI or HDMI
2	Computer 3	'IRGB 3',00DH	DVI-D, HDMI or HDMI-1
3	Computer 4	'IRGB 4',00DH	DVI-D, HDMI or HDMI-1
4	Component 1	'ICMP 1',00DH	
5	Component 2	'ICMP 2',00DH	
6	DVI	'IDVI 1',00DH	
7	Video 1	'IVED 1',00DH	RCA or S-Video
8	Video 2	'IVED 2',00DH	RCA or S-Video
9	Video 3	'IVED 3',00DH	Various
A	Video 4	'IVED 4',00DH	Various
B	Video 5	'IVED 5',00DH	Various
C	Video 6	'IVED 6',00DH	Various
D	S-Video	'ISEV 1',00DH	Some

- **BlankOn/BlankOff**, **SoundMuteOn/SoundMuteOff** and **Freeze/Unfreeze** are all supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state.
- An **AlignPixels (AutoSetup)** function is available if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- Make sure to turn off “Auto input search” if your projector includes this.

RS232 connections to Sharp/Eiki projectors

These use a D-sub 9-pin connector, female or male on cable: (May be via an adaptor cable from projector 9-pin mini-DIN) Communications is at 9600 baud 8N1. Some projectors may need this to be set up via an on-screen menu.

Function/Direction	**T470 "projector" Connection**	**Sharp Control Port Connector, D-sub 9**	**Sharp Control Port Connector DIN 9**
Ground	Ground	9-pin D-sub pin 5	9-pin D-sub pin 5
Data from T470 to projector	Tx	9-pin D-sub pin 2	9-pin D-sub pin 2
Reply data from projector to T470	Rx	9-pin D-sub pin 3	9-pin D-sub pin 3

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Sony A9 Proj 8E1: Code 4000h

Even parity: SONY VPL-BW5, VPL-CW125, VPL-CW255, VPL-CW258, VPL-CW275, VPL-CW278, VPL-CX61, VPL-CX63, VPL-CX80, VPL-CX85, VPL-CX86, VPL-CX100, VPL-CX120, VPL-CX125, VPL-CX130, VPL-CX131, VPL-CX135, VPL-CX150, VPL-CX155, VPL-CX160, VPL-CX161, VPL-CX165, VPL-CX235, VPL-CW238, VPL-CX275, VPL-CX278, VPL-ES4, VPL-EW7, VPL-EW130, VPL-EW225, VPL-EW226, VPL-EW245, VPL-EW246, VPL-EW275, VPL-EW276, VPL-EX4, VPL-EX5, VPL-EX7, VPL-EX50, VPL-EX70, VPL-EX71N, VPL-EX100, VPL-EX101, VPL-EX120, VPL-EX121, VPL-EX123, VPL-EX130, VPL-EX145, VPL-EX146, VPL-EX147, VPL-EX148, VPL-EX175, VPL-EX176, VPL-EX178, VPL-EX221, VPL-EX222, VPL-EX225, VPL-EX226, VPL-EX241, VPL-EX242, VPL-EX245, VPL-EX246, VPL-EX271, VPL-EX272, VPL-EX273, VPL-EX274, VPL-EX275, VPL-EX276, VPL-F400H/X , VPL-F401H, VPL-F500H, VPL-F501H , VPL-F600X, VPL-F700HL/XL, VPL-FE40, VPL-FH30, VPL-FH31, VPL-FH35, VPL-FH36, VPL-FH300L, VPL-FH500L, VPL-FW41/L, VPL-FW300L, VPL-FX30, VPL-FX35, VPL-FX37, VPL-FX40, VPL-FX41/L, VPL-FX50, VPL-FX51, VPL-FX52, VPL-FX500L, VPL-HW15, VPL-HW30, VPL-HW50, VPL-PX11, VPL-PX15, VPL-PX35, VPL-PX40, VPL-PX41, VPL-SW125, VPL-SW525/C, VPL-SW526/C, VPL-SW535/C, VPL-SX125, VPL-SX525, VPL-SX535, VPL-TX7, VPL-TX70, VPL-VW70, VPL-VW85, VPL-VW95, VPL-VW200, VPL-VW1000

Sony A9 Proj 8N1: Code 4010h

No parity: VPL-ES3/EX3NEC base 4800, audio 63: Code 2C30h

A protocol manual is at:
http://www.kavena.se/fileadmin/uploads/downloads/Sony/Projektorer/RS232/Protocol_Manual_Rev13.pdf

This family has common codes, but allocates the “Inputs A/B/C/D” differently.

Source	Label/Connector	Code sent	Comments
0	Computer 1	0A9h,000h,001h,000h,000h,002h,003h,09Ah	RGB 1
1	Computer 2	0A9h,000h,001h,000h,000h,003h,003h,09Ah	RGB 2
2	Input 4 RGB E	0A9h,000h,001h,000h,000h,006h,007h,09Ah	RGB E
3	Input 4 RGB F	0A9h,000h,001h,000h,000h,007h,007h,09Ah	RGB F
7	Video	0A9h,000h,001h,000h,000h,000h,001h,09Ah	RCA Composite Video
A	HDMI 1	0A9h,000h,001h,000h,000h,004h,005h,09Ah	HDMI 1
B	HDMI 2	0A9h,000h,001h,000h,000h,005h,005h,09Ah	HDMI 2
D	S-Video	0A9h,000h,001h,000h,000h,001h,001h,09Ah	

- **BlankOn/BlankOff,** and **SoundMuteOn/SoundMuteOff** are supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- No **Freeze** is available;

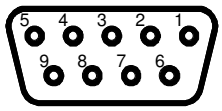
- `An **AlignPixels** function is available if an appropriate button is allocated;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to Sony projectors

These all use a D-sub 9-pin connector, male on cable.

Code 4000h units are 38400 BAUD, Even parity, 1 stop.

Code 4010h units are 38400 BAUD, No parity, 1 stop.

Function/Direction	**T470 serial Connection**	**Projector Connector (Male on cable)**	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Sony IR controlled projectors: Code 4040h

These panels are controlled either via an IR transmitter "bug" or LED IR transmitter.

There appear to be a couple of ways used for source selection with Sony projectors;

- IR codes are provided to access the "Source" menu and use the Up and Down arrows to select a line on the source table, and then use the "Enter" button to activate the selected source;
- Alternatively, just use the Source key … each press of the "Source" key increments through the source table. Leaving the high-lit selection on a different one will automatically select that one after a few seconds. Note: this projector differs from some other IR projectors/screens in that ALL sources can be selected, not just ones with an active or valid input. This makes it easy to use just a Source key for all selection functions;
- IR codes for some projectors supply direct selection of Video (and sometimes S-Video) as well as Inputs A->F. These use a normal keyboard layout, similar to RS232 controlled projectors.

Sony uses three different IR transmission formats (sometimes in the same projector):

- 12-bit SIRC code with a 7-bit "Command" followed by a 5-bit "device" string (not used here);
- 15-bit SIRC code with a 7-bit "Command" followed by an 8-bit "device" string. This is used by most commands in this driver;
- Two groups of 20-bit SIRC codes with a 7-bit "Command" followed by a 5-bit "device" string and an 8-bit "Extended" string. This is used by the "Return" (Projector-EE group), the "Freeze" and "Aspect" commands (Projector-E group).

Source	Label/Connector	IR Command Code sent	Command format	Comments
0	Source	57H	15 bit projector	Shows "Source" table
1	Up arrow	35H	15 bit projector	
2	Down arrow	36H	15 bit projector	
3	Right arrow	33H	15 bit projector	
4	Left arrow	34H	15 bit projector	
5	Enter	5AH	15 bit projector	
6	Menu	29H	15 bit projector	Enter menu setting
7	Return	6FH	Projector-EE	Exit from menu setting
8	Video	2AH	15 bit projector	Direct source command
9	S-Video	5FH	15 bit projector	Direct source command
A	Input-A	2BH	15 bit projector	Direct source command
B	Input-B	2CH	15 bit projector	Direct source command

C	Input-C	6FH	15 bit projector	Direct source command
D	Input-D	70H	15 bit projector	Direct source command
E	Input-E	71H	15 bit projector	Direct source command
F	Input-F	06H	15 bit projector	Direct source command

- **Blank, Mute, Aspect** and **Freeze** (some only)buttons are supported by the driver, but not all projectors appear to respond to all these commands;

- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connections to the projector to get status reports;

- Because there are no Power-On and Power-Off commands, **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic "Power" code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time.** This allows re-synchronisation of the controller with the panel if they get out of step, e.g. if another hand-held remote is used, or a closedown occurs. Just press the **Off** button if the LCD is On and you want it to go Off, and just press the **On** button to turn the LCD On if it Off and the T470 is in the On state. This nicely keeps everything is step**;** and

- Volume on the projector covers a 0->100 range. The Volume Up and Down keys trigger five quick transmission of the appropriate code, so the 0->100 range is covered by 20 presses maximum. The volume keys will auto-repeat if held down, but there is no "staying on" of the associated LED, as the controller has no way of knowing when a maximum or minimum is reached.

VivitekD1: Code 5C00h (also DigitalProjection E-Vision series)

D series: D516, D517, D517, D518, D519, D555, D517, D557W

D791, D795, D7180UM

D86, D87, D850, D851, D853W, D855ST, D856, D858, D860, D861, D862, D863, D864, D867, D869, D871ST, D873ST

D965 (Vol 0->8), D967, D966HD, D968U

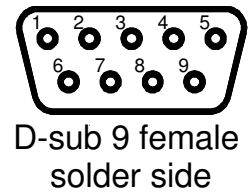
D5180HD, D5185HD, D5280U/UM, D5380u (All above are volume 0 -> 10 except where indicated)

Source	Label/Connector	Code sent	Comments
0	VGA 1	'V99S0201', 0DH	Computer 1
1	VGA 2	'V99S0202', 0DH	Computer 2
2	BNC	'V99S0207', 0DH	(some only)
4	Component	'V99S0208', 0DH	(some only) HDMI on some eg D86x, D87x series)
6	DVI-A	'V99S0203', 0DH	(some only)
7	Video	'V99S0204', 0DH	RCA
8	S-Video	'V99S0205', 0DH	
9	DVI-D	'V99S0203', 0DH	(Some only)
A	HDMI 1	'V99S0206', 0DH	(HDMI 2 on some eg D86x, D87x series))
B	HDMI 2/DP	'V99S0209', 0DH	(Some only) (DisplayPort on some, eg D5180HD, 5185HD)
C	HDMI 3/DP	'V99S0210', 0DH	(Some only) (DisplayPort on some, eg D967, D966HD, D968U)
D	DisplayPrt	'V99S0211', 0DH	(Some only) (eg D5280U/UM, D7180UM) (Some MultiMedia, eg D5380u

- **BlankOn/BlankOff, (includes sound mute On/Off)** and **Freeze On/Off** are supported if appropriate buttons are allocated. These are absolute functions and a LED indicates the current state;
- AspectRatio4:3 and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported ;
- **Auto-source** function (under Settings 2 menu) and **Auto Power On** must be turned Off

RS232 connections to Vivitek projectors with D9, female on cable

This uses a 9-pin-D9 male on the projector, female on cable. Communications is at 9600 baud, 8N1.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

LCD Panels

AHA LCD in 55”, 65”, 70”, 75”, 84”:

AHA LCD Source select: Code 6100h, Hitachi LCD HILF75101: code 6C00h (using absolute source selection.)

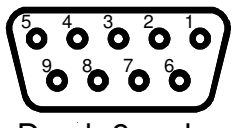
RS232 codes have been supplied by the importer.

Source	Label/Connector	Code sent (6100) Hit: (6C00)*	Comments
0	RGB-PC	kb 00 07 *	VGA on D-sub 15
2	OPS-IntPC	kb 00 0E	OPS (Internal PC)
4	Component (Option)	kb 00 04	3 x RCA (some only)
7	AV (Option)	kb 00 02	RCA (some only)
9	DVI-D	kb 00 08	DVI-D
10	HDMI 1	kb 00 09 *	HDMI 1
11	HDMI 2	kb 00 0a *	HDMI 2
12	HDMI 3-HD	kb 00 0b *	HDMI 3
14	DisplayPort	kb 00 0c *	DP
15	USB-A	kb 00 0d	SDI

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state; No **Freeze** is available;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Aspect rations of 4:3 and 16:9 are supported if an aspect key is provided.

RS232 connections to AHA panels:

D-SUB 9 Female on projector, male on cable. Comms at 9600 8N1

Function/Direction	T470 serial Connection	Serial Port Connector	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 2 (TXD)	
Ground	Ground	mini-DIN 8 pin 4	

After installation wiring of any device to a T470, use a multimeter to check voltages on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms. Note voltage FROM this panel is only -0.9 volt static, but pulses go sufficiently positive. T470 output should be -5 to -9 volts.

AHA LCD Arrows / Enter select: Code 6110 uses a source key, arrows and an OK/Enter key to select.

This code options allows navigating around the vertical source options list (and selecting one with the OK / Enter key. It also is needed if one desires to navigate around the sub-menus on USB devices or selecting files or images on a USB device from a full screen matrix of files “tiles”, etc. Operation is very similar to using the arrow cluster on an IR remote, but coms is via the more reliable RS232.

A possible keyboard using keyboard code KB1007 layout is:

Source	Left arrow	Right arrow	Up arrow	Volume Up
Off	On	OK / Enter	Down arrow	Volume Down

Key “source” setup options are:

Key function	**Label**	**Code sent (6110)**	**Comments**
0	Source key	mc 00 ac	Brings up vertical source list or menu
1	Up arrow key	mc 00 8d	Moves up source list / menu
2	Down arrow key	mc 00 8e	Moves down source list / menu
3	OK Enter key	mc 00 8c	Selects an option
4	Right arrow key	mc 00 90	Moves between menu selections
5	Left arrow key	mc 00 8f	Moves between menu selections
6	Menu key	mc 00 95	Brings up options menu
7	Exit key	mc 00 96	

BenQ LCD: Code 6200h (RP550+, RP551+, RP650+, RP651+, RP700+, RP840G)

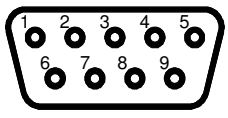
RS232 codes have not been found on the net, but have been supplied directly by BenQ Australia.

Source	Label/Connector	Code sent	Comments
0	DSUB PC	'800s', 22H, '000', 00DH	VGA
3	USB-B Disp	'800s', 22H, '011', 00DH	USB B
4	Component	'800s', 22H, '004', 00DH	3 x RCA
6	DVI	'800s', 22H, '006', 00DH	DVI
7	AV	'800s', 22H, '003', 00DH	RCA
8	S-Video	'800s', 22H, '005', 00DH	DIN-4
9	Multimedia	'800s', 22H, '009', 00DH	USB A
10	HDMI 1	'800s', 22H, '001', 00DH	HDMI 1
11	HDMI 2	'800s', 22H, '002', 00DH	HDMI 2
12	SDI	'800s', 22H, '008', 00DH	SDI
13	Disp.Port	'800s', 22H, '007', 00DH	Display Port
14	Network	'800s', 22H, '010', 00DH	Network

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state; No **Freeze** is available;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;

RS232 connections to BenQ LCD

These use a 9-pin-D9 male on the panel, female on cable. Coms is at 9600, 8N1

Function/Direction	T470 serial Connection	LG screen RS232 Port Connector	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual.

CommBox LCD IR: LCD panels: Code 6400h,

CommBox LCD Direct (via RES pin): Code 6410h

CommBox LCD Direct (via RL2 pin): Code 6420h

These panels are controlled either via an IR transmitter "bug" or via a direct connection into a 3.5mm socket in the rear of the panel. In "Direct" mode the 5 volt signal (on the RES pin or the RL2 pin, if an optional linking resistor is installed) is terminated internally by an input resistance of about 19 KOhms.

Source	Label/Connector	IR Command Code sent	Comments
0	PC	25H	DB15
4	Component 1	22H	RCA
7	Video	23H	RCA Composite Video
8	S-Video	24H	S-Video
9	DVI	26H	DVI
A	HDMI 1	27H	HDMI 1
B	HDMI 2	28H	HDMI 2

- No **Mute** or **Blank** or **Freeze** functions are supported;
- No Off-press connection report is available;
- No Run-time On-state ReplyMode is supported.

Hitachi LCD HILF75101: code 6C00h

See AHA on page 40

LG panels, xb codes 90/91/92/93: Code 7000h
LG panels, xb codes 70/80/90/A0: Code 7010h

There are two standards for how the HDMI channels at selected on these, and provide both standards with these drivers. The LG manuals often have the wrong ones indicated!

In the back of each "Owner's manual" is a list of "input select" codes … examine this table to determine if it uses "xb" for device channel selection.

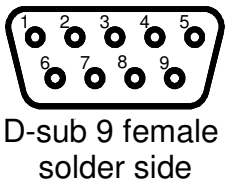
Source	Label/Connector	Code sent 7000h	Code sent 7010h	Comments
0	RGB-PC (new)	'xb 00 60', 00DH	'xb 00 60', 00DH	DB15
1	'RGBRGB-PC (old)'	'xb 00 50', 00DH	'xb 00 50', 00DH	DB15
2	DispPt.PC	'xb 00 D0', 00DH	'xb 00 D0', 00DH	DisplayPort PC
3	HDMI-PC	'xb 00 A0', 00DH	'xb 00 A0', 00DH	HDMI-PC
4	Component 1	'xb 00 40', 00DH	'xb 00 40', 00DH	RCA
5	Component 2	'xb 00 41', 00DH	'xb 00 41', 00DH	RCA
6	HDMI2-PC	'xb 00 A1', 00DH	'xb 00 A1', 00DH	HDMI2-PC
7	A/V 1	'xb 00 20', 00DH	'xb 00 20', 00DH	RCA Composite Video/S-Video
8	A/V 2	'xb 00 21', 00DH	'xb 00 21', 00DH	RCA Composite Video/S-Video
9	DVI-D PC	'xb 00 70', 00DH	'xb 00 70', 00DH	DVI-D PC
A	HDMI 1	**'xb 00 90', 00DH**	**'xb 00 70', 00DH**	HDMI 1
B	HDMI 2	**'xb 00 91', 00DH**	**'xb 00 80', 00DH**	HDMI 2
C	HDMI 3	**'xb 00 92', 00DH**	**'xb 00 90', 00DH**	HDMI 3
D	HDMI 4	**'xb 00 93', 00DH**	**'xb 00 A0', 00DH**	HDMI 4
E	DispPt.DTV	**'xb 00 C0', 00DH**	**'xb 00 C0', 00DH**	DisplayPort DTV
F	DTV	'xb 00 00', 00DH	'xb 00 00', 00DH	Digital TV
	TVChannelUp	'mc 00 00', 00DH	'mc 00 00', 00DH	Key for Channel Up
	TVChannelDown	'mc 00 01', 00DH	'mc 00 01', 00DH	Key for Channel Down

- **BlankOn/BlankOff,** and **SoundMuteOn/SoundMuteOff** are supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- No **Freeze** is available;

- An **AlignPixels** function is available if an appropriate button is allocated;
- AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to LG LCD, LG Plasma and Zenith flat screens

These use a 9-pin-D9 male on the panel, female on cable. Coms is at 9600, 8N1

Function/Direction	**T470 serial Connection**	**LG screen RS232 Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Some have clamp diodes on signal lines so voltages may be limited to -0.7 volts and plus 5v signal pulses.

Some might use reverse 2/3.

NEC Multeos flat panels: Code 7800h

Multeos and Multisync models LCD3210, LCD3215, LCD4215, LCD4615 LCD5710, LCD8205, MDT652S, M401/M461/M521, P401, P402, P461, P462, P521, P552, P702, S401,
S461, S521, V321, V422, V461, V462, V551, V651, V3212, X431BT, X461HB, X461S, X461UN, X463UN, X551S, X551UN,

Mitsubishi MDT321S (no HDMI) and many more … codes seem consistent across models.

Mitsubishi LCD: LDT462V, LDT551V, MDT652S has HDMI as Video 2

In the back of each user's manual is a list of typical channel selection messages, and manuals of NEC LCD panels are available at http://www.nec-display-solutions.com/p/uk/en/products/choice.xhtml?cat=PublicDisplays

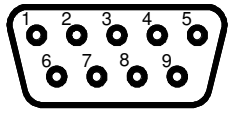
Source	Label/Connector	Code sent	Comments
0	RGB-PC (new)	01H,'0A0E0A',02H,'00600001',03H,073H,00DH	DB15
3	RGB/HV	01H,'0A0E0A',02H,'00600002',03H,070H,00DH	RGB/HV
6	DVI	01H,'0A0E0A',02H,'00600003',03H,071H,00DH	DVI
7	Video 1	01H,'0A0E0A',02H,'00600005',03H,077H,00DH	RCA Composite Video 1
8	Video 2	01H,'0A0E0A',02H,'00600006',03H,074H,00DH	RCA Composite Video 2
9	DVD/HD1	01H,'0A0E0A',02H,'0060000C',03H,001H,00DH	
A	HDMI	01H,'0A0E0A',02H,'00600011',03H,072H,00DH	HDMI
B	HDMI(set)	01H,'0A0E0A',02H,'00600004',03H,076H,00DH	HDMI set
C	DisplayPort	01H,'0A0E0A',02H,'0060000F',03H,004H,00DH	DisplayPort
D	DVD/HD2	01H,'0A0E0A',02H,'0060000E',03H,007H,00DH	
F	DTV	01H,'0A0E0A',02H,'0060000A',03H,003H,00DH	Digital TV
	TVChannelUp	01H,'0A0E0A',02H,'008B0001',03H,00FH,00DH	Key for Channel Up
	TVChannelDown	01H,'0A0E0A',02H,'008B0002',03H,00CH,00DH	Key for Channel Down

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state;
- No **Freeze** is available;
- Turn off ECO mode of the panel to enable On/Off control (some only);
- Switch "INPUT DETECT" to "NONE" to prevent channel changing when non-selected signals come and go;
- "DVI MODE" may need to be setup to control type of input signal expected on that input;

- AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to NEC LCD with D9

These use a 9-pin-D9 male on the plasma, female on cable. Comms is at 9600 baud, 8 bits, Odd parity, 1 stop.

Function/Direction	**T470 serial Connection**	**Screen RS232 Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

NEC E-series LCD panels: Code 7810h

E-series: NEC: E324, E424, E464, E554

A code manual is available from:

http://au.nec.com/en_AU/media/docs/products/displays/ExternalControlManual-E-Series_en.pdf

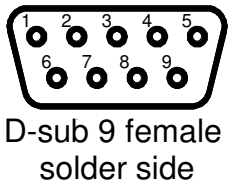
Beware, a US NEC site also pretends to offer codes for this family, but they are incorrect.

Source	Label/Connector	Code sent	Comments
0	RGB-PC (new)	01H,'0A0E0A',02H,'00600001',03H,073H,00DH	DB15
4	Component	01H,'0A0E0A',02H,'0060000C',03H,001H,00DH	3 x RCA
7	Video	01H,'0A0E0A',02H,'00600005',03H,077H,00DH	RCA Composite Video 1
8	Video 2	01H,'0A0E0A',02H,'00600006',03H,074H,00DH	RCA Composite Video 2
9	DVD/HD1	01H,'0A0E0A',02H,'0060000C',03H,001H,00DH	
A	HDMI 1	01H,'0A0E0A',02H,'00600011',03H,072H,00DH	HDMI 1
B	HDMI 2	01H,'0A0E0A',02H,'00600012',03H,071H,00DH	HDMI 2
C	HDMI 3	01H,'0A0E0A',02H,'00600013',03H,070H,00DH	HDMI 3
D	USB-A	01H,'0A0E0A',02H,'00600014',03H,077H,00DH	USB-A
F	DTV	01H,'0A0E0A',02H,'0060000A',03H,003H,00DH	Digital TV (some only)
	TVChannelUp	01H,'0A0E0A',02H,'008B0001',03H,00FH,00DH	Key for Channel Up
	TVChannelDown	01H,'0A0E0A',02H,'008B0002',03H,00CH,00DH	Key for Channel Down

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state. No **Blank** or **Freeze** is available;
- Volume in incremental only, and advances 5 counts each manual or auto-repeat step;
- Turn off ECO mode of the panel to enable On/Off control (some only);
- Switch “INPUT DETECT” to “NONE” to prevent channel changing when non-selected signals come and go;
- AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Off LED Comms-OK is NOT supported;

RS232 connections to NEC LCD with D9

These use a 9-pin-D9 male on the plasma, female on cable. Comms is at 9600 baud, 8 bits, Odd parity, 1 stop.

Function/Direction	**T470 serial Connection**	**Screen RS232 Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Panasonic LCD panels: Code 7C00h (Vol: 0->100)

With AV1: TH-42LF6U, TH-47LF6U, TH-55LF6U, TH-42LF30U, TH-47LF30U, TH-70LF50W, TH-80LF50W, TH-42LF60U, TH-47LF60U, TH-55LF60U, TH-42LFP30, TH-47LFP30

Without AV1: TH-42LF5U, TH-47LF5U, TH-42LFE6E, TH-50LFE6E, TH-47LFT30, TH-47LFX6J

In the back of each user's manual is a list of typical channel selection messages, and manuals of NEC LCD panels are available at http://www.nec-display-solutions.com/p/uk/en/products/choice.xhtml?cat=PublicDisplays

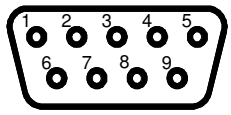
Source	Label/Connector	Code sent	Comments
0	PC	02H,'IMS:PC1',03H	DB15
1	DVIRGB	02H,'IMS:DV1RGB',03H	Via DVI
2	AV2RGB	02H,'IMS:AV2RGB',03H	Via AV2
3	SL1RGB	02H,'IMS:SL1RGB',03H	Via Slot SL1
4	DVIYUV	02H,'IMS:DV1YUV',03H	Via DVI
5	AV2YBR	02H,'IMS:AV2YBR',03H	Via AV2
6	SL1YUV	02H,'IMS:SL1YUV',03H	Via Slot SL1
7	Video: AV1	02H,'IMS:AV1',03H	RCA Composite Video 1
8	Video: AV2	02H,'IMS:AV2',03H	RCA Composite Video 2
9	DVI	02H,'IMS:DV1',03H	DVI
A	HDMI 1	02H,'IMS:HM1',03H	HDMI 1
B	HDMI 2	02H,'IMS:HM2',03H	HDMI 2
C	DL1	02H,'IMS:DL1',03H	Digital Link
D	SL1	02H,'IMS:SL1',03H	Slot SL1
E	SL1A	02H,'IMS:SL1A',03H	Via Slot SL1
F	SL1B	02H,'IMS:SL1B',03H	Via Slot SL1

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state;
- On panel connection blink codes supported and OPT7 handshake mode is supported;
- Enable the RS-232 control access by going to "Setup" then to "Network Setup" then "Control I/F Select" and set "RS-232";
- Audio control 0->100 (Volume up/down keyboards, codes 2, 9, B, and E) is available;
- Freeze is not supported at all;

- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)

RS232 connections to NEC LCD with D9

These use a 9-pin-D9 male on the plasma, female on cable. Comms is at 9600 baud, 8 bits, Odd parity, 1 stop.

Function/Direction	**T470 serial Connection**	**Screen RS232 Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Philips BDL series LCD: Codes 8000h -> 8100h

Philips have (currently) four (sorry ... five!) different serial protocols in current use and for sale in LCD/LED panels, and there is no central record or listing of which panels use which protocol. It seems that when a panel's software is updated (which can be done via a USB stick) the protocol of that panel can change, as well. (Note: the software revision numbers in the panels bear no relation to the protocol version numbers.) The four supported here all run at 9600 8N1, and also use two different connector systems, some a 4-sleeve miniature audio-type jack (supplied by Philips, cabled to a DB9), and some a DB9 male on the panel. (A fifth system protocol, called SerialXpress for HotelTV uses a 10-pin RJ50 connector, and runs at 38400 baud 8N1, and takes 66 pages to describe. Not supported yet.)

Protocol 1.6 (code 8000h) and 2.0 (code 8100h) are "non-addressed" protocol strings. If you don't know what protocol a particular panel uses, try 8000 and 8100 first. If it is a "non-addressed" protocol it will show Comms OK (one red LED blink) when connected and selected for this. If it shows three blinks, try the other ones (below) --- it may be an "addressed" protocol that is being used. If it is correctly a "non-addressed" protocol, and several source commands do not work, try other "non-addressed" one. Similarly, if you have identified the panel as "addressed" (longer messages), and e.g. the HDMI2 command selects VGA, then try the other "addressed" one.

Philips BDL series LCD 1.6 Protocol (non-addressed): Code 8000h

Some models we know of matching this driver are: **BDL4230E/BDL4230ET, BDL4651VH, BDL4675XU, BDL4681XU, BDL4785SL, BDL5530EL, BDL5585XL, BDL6450AT, BDL6531E, BDL6551V.**

One (unofficial!) link we have is: http://www.remotecentral.com/cgi-bin/mboard/rs232-ip/thread.cgi?13

Philips BDL series LCD 1.6:

Source	Label/Connector	Code sent	Comments
0	PC	008H,001H,0ACH,005H,000H,001H,000H,0A1H	DB15
4	Component	008H,001H,0ACH,003H,000H,001H,000H,0A7H	3 x RCA
7	Video	008H,001H,0ACH,001H,000H,001H,000H,0A5H	RCA Composite Video 1
9	DVI-D	008H,001H,0ACH,009H,001H,001H,000H,0ACH	DVI-D
A	HDMI	008H,001H,0ACH,009H,000H,001H,000H,0ADH	HDMI
B	DisplayPort	008H,001H,0ACH,007H,001H,001H,000H,0A2H	DisplayPort
D	S-Video	008H,001H,0ACH,001H,001H,001H,000H,0A4H	
F	USB-A	008H,001H,0ACH,008H,001H,001H,000H,0ACH	USB-A

Philips BDL series LCD 2.0 Protocol (non-addressed): Code 8100h

Very similar to V1.6 above except for some changes to source commands.

Some models we know of matching this driver are: **BDL3245E, BDL4245E, BDL4645E,** maybe **BDL4231.**

Source	Label/Connector	Code sent	Comments
0	PC	008H,001H,0ACH,005H,000H,000H,000H,0A0H	DB15
4	Component 1	008H,001H,0ACH,003H,000H,000H,000H,0A6H	
5	Component 2	008H,001H,0ACH,003H,001H,000H,000H,0A7H	
7	Video	008H,001H,0ACH,001H,000H,000H,000H,0A4H	RCA Composite Video 1
9	DVI-D	008H,001H,0ACH,009H,001H,001H,000H,0ACH	
A	HDMI 1	008H,001H,0ACH,009H,000H,000H,000H,0ACH	HDMI 1
B	HDMI2	008H,001H,0ACH,009H,001H,000H,000H,0ADH	HDMI 2
D	S-Video	008H,001H,0ACH,001H,001H,001H,000H,0A4H	

Philips BDL series LCD 1.86 Protocol (addressed): Code 8020h

Source	Label/Connector	Code sent	Comments
0	PC	009H,001H,001H,0ACH,005H,000H,001H,000H,0A1H	DB15
4	Component	009H,001H,001H,0ACH,003H,000H,001H,000H,0A7H	3 x RCA
7	Video	009H,001H,001H,0ACH,001H,000H,001H,000H,0A5H	RCA Comp. Video 1
9	DVI-D	009H,001H,001H,0ACH,009H,001H,001H,000H,0ACH	DVI-D
A	HDMI 1	009H,001H,001H,0ACH,009H,000H,001H,000H,0ADH	HDMI 1
B	HDMI 2	009H,001H,001H,0ACH,005H,001H,001H,000H,0A0H	HDMI 2
C	DisplayPort 1	009H,001H,001H,0ACH,007H,001H,001H,000H,0A2H	DisplayPort 1
D	DisplayPort 2	009H,001H,001H,0ACH,006H,001H,001H,000H,0A3H	DisplayPort 2
D	S-Video	009H,001H,001H,0ACH,001H,001H,001H,000H,0A4H	S-Video
F	USB-A	009H,001H,001H,0ACH,008H,001H,001H,000H,0ADH	USB-A

Philips BDL series LCD 1.87 Protocol (addressed): Code 8028h

Models include: BDL6520QL, BDL6526QT, BDL5588XH, BDL5588XL, BDL4677XH, BDL4678XL, BDL4776XL, BDL4777XL, BDL5586XL, BDL5588XH

Source	Label/Connector	Code sent	Comments
0	PC	009H,001H,000H,0ACH,005H,000H,001H,000H,0A0H	DB15
3	USB-B	009H,001H,000H,0ACH,006H,000H,001H,000H,0A3H	USB-B
4	Component	009H,001H,000H,0ACH,003H,000H,001H,000H,0A6H	3 x RCA
7	Video	009H,001H,000H,0ACH,001H,000H,001H,000H,0A4H	RCA Comp. Video
9	DVI-D	009H,001H,000H,0ACH,009H,001H,001H,000H,0ADH	DVI-D
A	HDMI 1	009H,001H,000H,0ACH,009H,000H,001H,000H,0ACH	HDMI 1
B	HDMI 2	009H,001H,000H,0ACH,005H,001H,001H,000H,0A1H	HDMI 2
C	DisplayPort 1	009H,001H,000H,0ACH,007H,001H,001H,000H,0A3H	DisplayPort 1
D	DisplayPort 2	009H,001H,000H,0ACH,006H,001H,001H,000H,0A2H	DisplayPort 2
D	S-Video	009H,001H,000H,0ACH,001H,001H,001H,000H,0A5H	S-Video
F	USB-A	009H,001H,000H,0ACH,008H,001H,001H,000H,0ACH	USB-A

Philips BDL series LCD 1.88 Protocol (addressed): Code 8030h

Very similar to V1.86 above except for some changes to source commands.

Models include: BDL3260EL, BDL4260EL, BDL4660EL, BDL4765EL, BDL5560EL, BDL4280VL, BDL4680VL, BDL5580VL, BDL3230QL, BDL4330QL, BDL4830QL, BDL5530QL

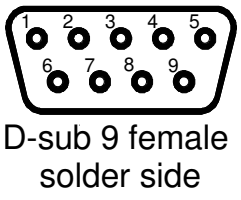
Source	Label/Connector	Code sent	Comments
0	PC	009H,001H,001H,0ACH,005H,000H,001H,000H,0A1H	DB15
4	Component	009H,001H,001H,0ACH,003H,000H,001H,000H,0A7H	3 x RCA
7	Video	009H,001H,001H,0ACH,001H,000H,001H,000H,0A5H	RCA Comp. Video 1
9	DVI-D	009H,001H,001H,0ACH,00EH,000H,001H,000H,0AAH	DVI-D
A	HDMI 1	009H,001H,001H,0ACH,00DH,000H,001H,000H,0A9H	HDMI 1
B	HDMI 2	009H,001H,001H,0ACH,006H,000H,001H,000H,0A2H	HDMI 2
C	DisplayPort 1	009H,001H,001H,0ACH,00AH,000H,001H,000H,0AEH	DisplayPort 1

D	DisplayPort 2	009H,001H,001H,0ACH,007H,000H,001H,000H,0A3H	DisplayPort 2
D	S-Video	009H,001H,001H,0ACH,002H,000H,001H,000H,0A6H	S-Video
F	USB-A	009H,001H,001H,0ACH,00CH,000H,001H,000H,0A8H	USB-A

- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.)
- No Picture and Sound Mute is available, nor any Freeze ;
- Aspect ratio control is not supported.

Above RS232 connections to Philips LCD/LED with D9

Some use a 9-pin-D9 male on the LCD, female on cable. Others use a 4-sleeve miniature audio-type jack (supplied by Philips, cabled to a DB9). Comms is at 9600 baud, 8 bits, no parity, 1 stop.

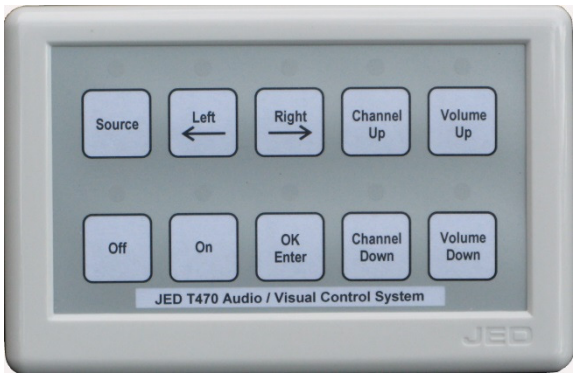
Function/Direction	**T470 serial Connection**	**Screen RS232 Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to panel	Tx	9-pin D-sub pin 3	
Reply data from panel to T470	Rx	9-pin D-sub pin 2	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.

Philips LCD TV via IR 1, Common Power On/Off: Code 8200h

Philips LCD TV via IR 3, sending commands 3 times: Code 8210h

These panels are controlled either via an IR transmitter "bug" or LED IR transmitter. They use the RC6 protocol.



IR codes are provided to access the "Source" menu and then use the arrows to select an entry on the source table, and then use the OK button to activate the selected source.

The source table on some Philips units is **horizontally scrolling**, so left/right arrow keys are needed (see picture):

This is neatly done with the KB1022A 10-key layout:

Source	Left arrow	Right arrow	Channel Up	Volume up
Off	On	OK / Enter	Channel Down	Volume Down

On others, it is a **vertical list**, so Up/Down arrows are needed. After the "Source" key is pressed and the menu appears, use the Up and Down arrows to select a line on the source table, and then use the OK button to activate the selected source. This is neatly done with the KB1019 10-key layout:

Source	Up arrow	Down arrow	OK	Volume up
Off	On	Channel Down	Channel Up	Volume Down

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided, as is the Mute function.

Source	**Label/Connector**	**IR Command Code sent**	**Comments**
0	Source	38H	Shows "Source" table
1	Up arrow	58H	Select source Up
2	Down arrow	59H	Select source Down
3	OK Enter	5CH	Activate the function
4	Right arrow	5BH	Select source Right
5	Left arrow	5AH	Select source Left
	TVChannelUp	51H	
	TVChannelDown	4DH	

- **A Mute button** is supported but freeze is not;

- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports;

- Because there are no Power-On and Power-Off commands, **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic "Power" code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time**.

  This allows re-synchronisation of the controller with the panel if they get out of step, e.g. if another hand-held remote is used, or a closedown occurs. Just press the **Off** button if the LCD is On and you want it to go Off, and just press the **On** button to turn the LCD On if it Off and the T470 is in the On state. This nicely keeps everything is step.

Samsung LCD and Plasma panels: Code 8800h

Plasma: 42”: P42H(n), P42H-2, PS-42P3ST, SPD-42P3SM, PPM42S2, PPM42S3, PS-42P2ST,
50”:P50H(n), P50FP, P50HP, PPM50H3, PS-50P2HT, PPM50H2, P50F(n), SPD-50P3HM,
63”: P63F(n), P63FP(x), PPM63H3, SPD-63P3HM,
Various: PPMxxM5x, PPMxxM7x.
LCD: 23”: 230MXn , 230TSn,
32”:320DX, 320MP(n), 320MX(n), 320P(N), 320PX , 323TSn,
40”: 400CX(n), 400DX , 400DX(n), 400FP(n), 400FX(n), 400MP(n), 400MX(n), 400P(n), 400PX(n), 400TSn, 400TX(n), 400UX(n), 403T, CT40CS(N),
46”: 460CX(n), 460DMn, 460DR(n), 460DX(n), 460FP(n), 460MP(n), 460MX(n), 460P(n), 460PX(n), 460Rn , 460TX(n), 460TS(n), 460UT(n), 460UX(n),
52”: 520DX(n),
55”: 550DX(n),
65”: ME65B(n)
70”: 700DX , 700DX(n), 700DRn, 700TSn
75”: ME75B(n)
82”: 820DX, 820DX(n), 820TSn.

and newer series: DB, DE, DH, DM, EDxxC, EDxxD, H, LE, ME, PE, UD and UE.

The protocol is at http://www.samsung.com/us/pdf/MDC_400DXn460DXn570DXn700DXn820DXn460TXn_v1.pdf

LFD LCD series: DE40A/B/C, DE46A/B/C, DE55A/B/C, ED32C, ED40C, ED46C, ED55C, ED65C, ED75C, H32, H40, LE32C, LE46C, LE55C, MD32B/C, MD40B/C, MD46B/C, MD55B/C, MD65C, ME32B/C, ME40A/B/C, ME46A/B/C, ME55A/B/C, ME65B, ME75B/C, NL22B, PE40C, PE46C, PE55C, SL46B, UD22A, UD55A, UD46C, UD55C, UE46A/C, UE55A/C

Samsung Australia can also supply protocol data by model.

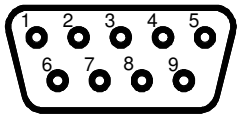
Source	Label/Connector	Code sent	Comments
0	DSUB PC	0AAH,014H,0FEH,001H,014H,027H	DB15
2	PlugIn Mod	0AAH,014H,0FEH,001H,050H,063H	Plug in Module
3	BNC	0AAH,014H,0FEH,001H,01EH,031H	BNC
4	Component	0AAH,014H,0FEH,001H,008H,01BH	RCA Component
5	MagInfoLte	0AAH,014H,0FEH,001H,060H,073H	MagicInfo Lite(USB port)
6	DVI	0AAH,014H,0FEH,001H,018H,02BH	DVI
7	AV/AV1	0AAH,014H,0FEH,001H,00CH,01FH	RCA Composite Video 1
8	AV2	0AAH,014H,0FEH,001H,00DH,020H	AV2
9	S-Video	0AAH,014H,0FEH,001H,004H,017H	S-Video
A	HDMI 1	0AAH,014H,0FEH,001H,021H,034H	HDMI 1
B	HDMI 2	0AAH,014H,0FEH,001H,023H,036H	HDMI 2

C	HDMI 3	0AAH,014H,0FEH,001H,031H,044H	HDMI 2
D	Disp.Port	0AAH,014H,0FEH,001H,025H,038H	DisplayPort
E	MagInfoNet	0AAH,014H,0FEH,001H,020H,033H	MagicInfo/Net
F	DTV	0AAH,014H,0FEH,001H,040H,053H	Digital TV
	TVChannelUp	0AAH,061H,0FEH,001H,000H,060H	Key for Channel Up
	TVChannelDown	0AAH,061H,0FEH,001H,001H,061H	Key for Channel Down

- **SoundMuteOn/SoundMuteOff** are supported if an appropriate button is allocated. This is an absolute function and a LED indicates the current state. (No **Freeze** is available;)
- Switch "INPUT DETECT" to "NONE" to prevent channel changing when non-selected signals come and go;
- AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- An **AlignPixels** function is available if an appropriate button is allocated;
- Turn "Energy Saving" to "Off" (to enable RS232 control);
- Make sure to use the correct "In" RS232 port (there are two, an "In", and an "Out", for cascading);
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported (subject to test);
- Run-time On-state ReplyMode is supported (controller senses state of projector and closes down if projector has timed out or been turned off manually or via IR control.) (subject to test);

RS232 connections to Samsung panel

These use a 9-pin-D9 male on the panel, female on cable. Comms is at 9600 baud, 8 N1. (Some use a 3.5mm stereo jack to D9 adaptor.)

Function/Direction	**T470 serial Connection**	**Screen "Serial" Port Connector**	 D-sub 9 female solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Sharp LCD Vol 0-100 (HDMI=1-4, PC=8): Code 8C00h

LC-70LE951X/ LC-70LE950X/LC-60LE951X/LC-60LE950X
LC-80LE857U/LC-70LE857U/LC-60LE857U, LC-80LE757U/LC-70LE757U/LC-60LE757U,
LC-70LE755U/LC-60LE755U, LC-90LE657U/LC-80LE657U/LC-70LE657U/LC-60LE657U,
LC-70LE655U/LC-60LE655U, LC-80LE650U/LC-70LE650U/LC-60LE650U ,
LC-70LE7500U/ LC-60LE7500U , **LC-80LE6500U/LC-70LE6500U/LC-60LE6500U**
(These use the channel allocations in the table below.)

Sharp LCD Vol 0-100 (HDMI=1-4, PC=7): Code 8C10h

LC-80LE940X/ LC-60LE940X/LC-52LE840X/LC-46LE840X. **LC-90LE740X, LC-LE640X,**. These use IAVD1-4 codes in the table below for HDMI1-4, IAVD5-6 for Component and Video, and IAVD7 for VGA-PC.
(These use the channel allocations in the table below.)

Sharp LCD Vol 0-100 (HDMI=1-3, PC=6): Code 8C20h

LC-32LE355X/LC-40LE355X. These use IAVD1-3 codes in the table below for HDMI1-3, IAVD4-5 for Vid/Component and Video, and IAVD6 for VGA-PC.
(These use the channel allocations in the table below.)

RS232 codes are usually in a Sharp User Manual and can be found by searching in Google for a PDF file with the LCD model number. **NOTE: Sharp panels need "Hotel Mode" set. Contact Sharp for how to do this, to enable RS232.**

Source	Label/Connector	Code sent 8C00h	Code sent 8C10h	Code sent 8C20h	Comments
0	VGA PC	'IAVD8 ', 0DH	'IAVD7 ', 0DH	'IAVD7 ', 0DH	DB15
4	Component	'IAVD5 ', 0DH			RCA
7	Video In 1	'IAVD6 ', 0DH			RCA Composite Video
7	AV1/Comp		'IAVD5 ', 0DH*	'IAVD5 ', 0DH*	RCA Composite Video /*Component
8	Video In 2/AV2	'IAVD7 ', 0DH	'IAVD6 ', 0DH	'IAVD6 ', 0DH	RCA Composite Video
A	HDMI 1	'IAVD1 ', 0DH	'IAVD1 ', 0DH	'IAVD1 ', 0DH	HDMI 1
B	HDMI 2	'IAVD2 ', 0DH	'IAVD2 ', 0DH	'IAVD2 ', 0DH	HDMI 2
C	HDMI 3	'IAVD3 ', 0DH	'IAVD3 ', 0DH	'IAVD3 ', 0DH	HDMI 3
D	HDMI 4	'IAVD4 ', 0DH	'IAVD4 ', 0DH	'IAVD4 ', 0DH	HDMI 4
F	DTV	'IDTV ', 0DH	'IDTV ', 0DH	'IDTV ', 0DH	Digital TV
	TVChannelUp	'DTUP ', 0DH	'DTUP ', 0DH	'DTUP ', 0DH	Key for Channel Up
	TVChannelDown	'DTDW ', 0DH	'DTDW ', 0DH	'DTDW ', 0DH	Key for Channel Down

Sharp LCD Vol 0-60 (HDMI=4-7, PC=8): Code 8D00h

LC-60LE835X/LC-52LE835X/LC-46LC835/LC-40LE835X,
LC-60LE635E/LC-60LE635RU/LC-60LE636E/LC-60LE636S, LC-70LE735X,
LC-60LE830X/LC-52LE830X/LC-46LE830X/LC-40LE830X
(These use the channel allocations in the table below.)

Sharp LCD Vol 0-60 (HDMI=1-3, PC=7): Code 8C10h

LC-40LE530X/LC-46LE530X/LC60LE630X, LC-60LE631X, LC-46LE700X/LC-52LE700X,LC-40M500X,
LC32D77X/LC-42D77X/LC46D77X/LC52D77X, LC-32L450X/LC-40L550X/LC40L650X
These use IAVD1-3 codes in the table below for HDMI1-4, IAVD4,5&6 for Video and Component, and IAVD7 for VGA-PC. (These use the channel allocations in the table below.)

Sharp LCD Vol 0-60 (HDMI=4-6, PC=7): Code 8C20h

LC-65RX1X. These use IAVD4-6 codes in the table below for HDMI1-3, IAVD1-3 for Vid/Component and Video, and IAVD7 for VGA-PC. (These use the channel allocations in the table below.)

RS232 codes are usually in a Sharp User Manual and can be found by searching in Google for a PDF file with the LCD model number.

Source	Label/Connector	Code sent 8D00h	Code sent 8D10h	Code sent 8C20h	Comments
0	VGA PC	'IAVD8 ', 0DH	'IAVD7 ', 0DH	'IAVD7 ', 0DH	DB15
4	Component	'IAVD3 ', 0DH			RCA Comp
4	Vid/Comp1		'IAVD6 ', 0DH	'IAVD1 ', 0DH	RCA Comp / Video
7	Video In 1	'IAVD1 ', 0DH	'IAVD4 ', 0DH*	'IAVD2 ', 0DH	RCA Composite Video *&S-Vid
8	Video In 2	'IAVD2 ', 0DH	'IAVD5 ', 0DH	'IAVD3 ', 0DH*	RCA Composite Video *&S-Vid
A	HDMI 1	'IAVD4 ', 0DH	'IAVD1 ', 0DH	'IAVD4 ', 0DH	HDMI 1
B	HDMI 2	'IAVD5 ', 0DH	'IAVD2 ', 0DH	'IAVD5 ', 0DH	HDMI 2
C	HDMI 3	'IAVD6 ', 0DH	'IAVD3 ', 0DH	'IAVD6 ', 0DH	HDMI 3
D	HDMI 4	'IAVD7 ', 0DH			HDMI 4
F	DTV	'IDTV ', 0DH	'IDTV ', 0DH	'IDTV ', 0DH	Digital TV
	TVChannelUp	'DTUP ', 0DH	'DTUP ', 0DH	'DTUP ', 0DH	Key for Channel Up
	TVChannelDown	'DTDW ', 0DH	'DTDW ', 0DH	'DTDW ', 0DH	Key for Channel Down

Sharp LCD Vol 0-60 (HDMI=4-6, PC=3): Code 8D30h

LC-60LE925X, LC-40LE820X/LC-46LE820X/LC-52LE820X
(These use the channel allocations in the table below.)

Sharp LCD Vol 60 (HDMI=4, No PC): Code 8D40h

LC-32BD6X/LC37BD6X (These use the channel allocations in the table below.)

RS232 codes are usually in a Sharp User Manual and can be found by searching in Google for a PDF file with the LCD model number.

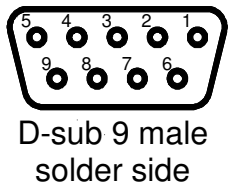
Source	Label/Connector	Code sent 8D30h	Code sent 8D40h	Comments
0	VGA PC	'IAVD3 ', 0DH		DB15
4	Component	'IAVD1 ', 0DH		RCA Comp
7	Video In 1	'IAVD2 ', 0DH		RCA Comp
7	Video/Com1		'IAVD1 ', 0DH	RCA Composite Video /Component
8	Video/Com2		'IAVD2 ', 0DH	RCA Composite Video /Component
9	Video/S-Vd		'IAVD3 ', 0DH	RCA Composite Video &S-Vid
A	HDMI 1	'IAVD4 ', 0DH	'IAVD4 ', 0DH	HDMI 1
B	HDMI 2	'IAVD5 ', 0DH		HDMI 2
C	HDMI 3	'IAVD6 ', 0DH		HDMI 3
D	HDMI 4	'IAVD7 ', 0DH		HDMI 4
F	DTV	'IDTV ', 0DH	'IDTV ', 0DH	Digital TV
	TVChannelUp	'DTUP ', 0DH	'DTUP ', 0DH	Key for Channel Up
	TVChannelDown	'DTDW ', 0DH	'DTDW ', 0DH	Key for Channel Down

BlankOn/BlankOff is supported with a keyboard option. These is an absolute function and a LED indicates the current state;

- No **Freeze** is available;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- Run-time On-state ReplyMode is supported.

RS232 connections to Smart LCD

These use a 9-pin-D9 male on the projector, male on cable. Communications is at 9600 baud 8N1.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to screen	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from screen to T470	Rx	9-pin D-sub pin 2 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

Soniq LCD TV, Common Power On/Off: Code 9000h

These panels are controlled either via an IR transmitter "bug" or LED IR transmitter.

IR codes are provided to access the "Source" menu and use the Up and Down arrows to select a line on the source table, and then use the OK button to activate the selected source. This is neatly done with the KB1019 10-key layout:

Source	Up arrow	Down arrow	OK	Volume up
Off	On	Channel Down	Channel Up	Volume Down

Volume Up/Down and TV channel Up/Down for the DTV tuner are provided, as is the Mute function.

Source	**Label/Connector**	**IR Command Code sent**	**Comments**
0	Source	1EH	Shows "Source" table
1	Up arrow	44H	Select source Up
2	Down arrow	1DH	Select source Down
3	OK Enter	5CH	Activate the function
4	Right arrow	48H	
5	Left arrow	1CH	
	TVChannelUp	51H	
	TVChannelDown	4DH	

- **A Mute button** is supported but freeze is not;
- No Off-press connection report is available, and no Run-time On-state ReplyMode is supported (because there is no direct connection to the projector to get status reports;
- Because there are no Power-On and Power-Off commands, **this driver MUST use T470 keyboards defined with separate OFF and ON keys**. The generic "Power" code is sent once when the Off button is pressed **at any time** and once when the On button is pressed **at any time**.

  This allows re-synchronisation of the controller with the panel if they get out of step, e.g. if another hand-held remote is used, or a closedown occurs. Just press the **Off** button if the LCD is On and you want it to go Off, and just press the **On** button to turn the LCD On if it Off and the T470 is in the On state. This nicely keeps everything is step.

- Soniq is also included in the "AuxIR" code family (see Part C T470 manual), allowing an RS232 controlled projector in an installation to be teamed with an IR controlled LCD in a single T470. A single button on the T470 can just send the toggling "Power" command to an LCD while the rest of the T470 buttons controls the main projector via RS232.

Sony Bravia LCD: Code 9400h

LCD-TVs KDL-HX92x/82x/72x, NX72x, EX72x/62x/52x/46x/42x/32x, CX52x/400

These are commercial panels which, while they don't have RS232 ports, do allow RS232 control via an interface box feeding commands into the HDMI **C**onsumer **E**lectronics **C**ontrol system. The interface boxes from Sony are called CBX-H10/1 and CBX-H11/1 and have their own power supply.

RS232 codes are usually in a Sony Protocol Manual and can be found by searching in Google for a PDF file with the LCD model number.

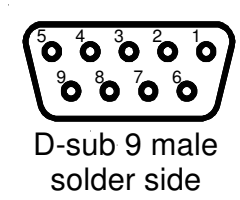
Source	Label/Connector	Code sent	Comments
0	PC	08CH,000H,002H,003H,005H,001H,097H	DB15
7	Video 1	08CH,000H,002H,003H,002H,001H,094H	RCA Composite Video
8	Video 2& Component	08CH,000H,002H,003H,003H,001H,095H	RCA
A	HDMI 1	08CH,000H,002H,003H,004H,001H,096H	HDMI 1
B	HDMI 2	08CH,000H,002H,003H,004H,002H,097H	HDMI 2
C	HDMI 3	08CH,000H,002H,003H,004H,003H,098H	HDMI 3
D	HDMI 4	08CH,000H,002H,003H,004H,004H,099H	HDMI 4
F	DTV	08CH,000H,002H,002H,001H,091H	Digital TV
	TVChannelUp	08CH,000H,004H,003H,000H,000H,093H	Key for Channel Up
	TVChannelDown	08CH,000H,004H,003H,000H,001H,094H	Key for Channel Down

- **BlankOn/BlankOff,** and **SoundMuteOn/SoundMuteOff** are supported if appropriate buttons are allocated. Combined **Blank/SoundMute** is also supported with a keyboard option. These are absolute functions and a LED indicates the current state;
- No **Freeze** is available;
- AspectRatio4:3(large) and AspectRatio16:9 are supported if an **AspectRatio** key is allocated. This is a rolling function with no LED indication of state;
- Off LED Comms-OK (one blink) and NoComms (three blinks) is supported;
- As of V037, the ON command is sent twice to turn on latest panels with deep sleep mode, and warm-up time has been increased to 22 seconds to allow panel boot up. Sony advise: For **all** RS232 commands to function on the Android TV models the set must be upgraded to the latest available software which is currently pkg2.465, available to download from sony.com.au /support, or an auto update can be done if the TV is connected to the WWW. One difference is that if the TV has been off for more than 15 minutes it will then be in deep standby which will require the ON command to be sent twice.
- Run-time On-state ReplyMode is not supported.

RS232 connections to Sony LCD flat panel

These all use a D-sub 9-pin connector, male on cable.

LCD panels, 9600 BAUD, No parity, 1 stop.

Function/Direction	**T470 serial Connection**	**"Serial" Port Connector**	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 2 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 3 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the "K-Ohms" setting. This should be 4k to 8 K-Ohms.

2-Touch / CTOUCH LCD touch panel: Code 9800h

These are an LG-style panel with touchscreen add-on on the front, in sizes of 46”, 55”, 65”, 70”, 82” and 84”.

Protocol document is at:

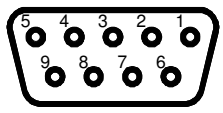
http://www.c-tools.nl/Files/Producten/CTOUCH/CTOUCH%20RS232C_Protocol_MODEL%20B%2046_55_65_70_82_3%20HDMI.pdf

Source	Label/Connector	Code sent	Comments
0	PC	'kb 00 07',00DH	DB15
0	Component	'kb 00 04',00DH	RCA
7	AV	'kb 00 02',00DH	RCA Composite Video
8	S-Video	'kb 00 03',00DH	DIN 4
A	HDMI 1	'kb 00 09',00DH	HDMI 1
B	HDMI 2	'kb 00 0a',00DH	HDMI 2
C	HDMI 3	'kb 00 0b',00DH	HDMI 3
F	DTV	'kb 00 00',00DH	Digital TV

RS232 connections to 2-Touch / CTOUCH LCD projectors:

D-SUB 9 Female on panel, male on cable. Comms at 9600 8N1.

Note: Connector wiring on 2-Touch and CTOUCH documentation is totally incorrect, (e.g. Gnd on pin 1, links on 8->9) Following has been tested and works correctly. Don’t link pins 8 & 9.

Function/Direction	T470 serial Connection	“Serial” Port Connector	 D-sub 9 male solder side
Ground	Ground	9-pin D-sub pin 5	
Data from T470 to projector	Tx	9-pin D-sub pin 3 (RXD)	
Reply data from projector to T470	Rx	9-pin D-sub pin 2 (TXD)	

After installation wiring of any projector to a T470, use a multimeter to check voltages of –9 on BOTH TX and RX pins in any installation, as described in the troubleshooting part of this manual. A useful check that you have actually connected to a valid RS232 input on the projector is to unplug the cable from the controller and measure resistance down the cable to ground using a multimeter on the “K-Ohms” setting. This should be 4k to 8 K-Ohms.